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Professor EUGEN STEINACH, M.D.,  
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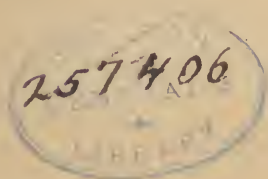
# REJUVENATION AND THE PROLONGATION OF HUMAN EFFICIENCY

Experiences with the Steinach-Operation  
on Man and Animals

BY  
DR. PAUL KAMMERER

With an Introduction by  
DR. HARRY BENJAMIN

*ILLUSTRATED*



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DEDICATED

to

DR. HARRY BENJAMIN

as a token of sincere friendship and appreciation  
of his distinguished services in introducing and  
applying the Steinach Method of Rejuvenation in  
the United States.



## PREFACE

At the beginning of the second half of the last century, the proof of the theory of evolution—that simple forms of life develop into more complex ones—was established by the publication of Charles Darwin's most important work on "Origin of Species." Darwin's contemporaries were able to observe how the idea of evolution, branching out from its original source—biological research—irresistibly encompassed almost all the other realms of human knowledge and accomplishments, be they ever so remote.

Today, to all appearances, we once more find ourselves at the beginning of a similar process of conquest, penetration, and transmutation instigated by biology in general, and particularly by Eugen Steinach's epochal treatise on "Verjüngung durch experimentelle Neubelebung der alternden Pubertätsdrüse" (Rejuvenation by Revivifying the Aging Puberty Gland). In this treatise, the idea of rejuvenation—germinating from the theory of evolution to which it is closely related—is presented to the world for the first time in a scientifically substantiated form and, in spite of all opposition, is forging ahead on the road to victory.

May I not be permitted to prove this assertion with at least one instance? What seems farther removed from applied science than the fine arts? Nevertheless, shortly after Darwin's imposing appearance, literature developed a distinctly new form in the so-called Evolution Novel. Exactly analogous to what happened then, our present time has brought forth the Rejuvenation Novel of which Gertrude Atherton's remarkable book, "Black Oxen," is an example within closest reach.

Still another symptom, commonly inherent to the irresistibly penetrating strength of humanity's highest aspiration, which frequently manifests itself in the history of mankind is the fact that these aspirations usually require a maturing period of many centuries before they finally assert themselves. The theory of evolution established by Darwin was generally accepted by the old Greek philosophers, like Anaximandros (546 B.C.), Herakleitos (500 B. C.), and Empedoklos (450 B.C.) . . . just to mention a few of them. Suppressed during the Middle Ages, the idea was reborn and gradually gained in strength at the end of the eighteenth and the beginning of the nineteenth centuries, in the writings of Oken, Treviranus, Goethe, Lamarck, Erasmus, and Darwin. But it took another half century to collect sufficient scientific data that might be used as props and proofs for the theory of evolution which, until then, had mostly been approached from an abstract, philosophical angle. Charles

Darwin's life work consisted in collecting an enormous amount of empirical evidence, thus endeavoring to ward off opposition of any kind and, whenever possible, to suppress it at the very outset.

Similarly, the triumph of the idea of rejuvenation may logically be expected at a time when sufficient new achievements within the realm of natural science substantiate the purely mental conception of rejuvenation which had previously attained dizzy heights. Evidently this time has now arrived. If we could say of the idea of evolution that its roots reach as far back as the classical ages, then the idea of rejuvenation—or rather let us say the *dream* of rejuvenation—is as old as mankind itself. All of those beliefs revolving around the idea of resurrection, the transmigration of souls, and eternal life are fundamentally nothing but manifestations of the one unquenchable desire to regain lost youth. So is the Ecpyrosis of Herakleitos and the Stoics, the Apocatastasis of the Apostolic Fathers and the Evangelical Orthodox and the Pantheistic Mystics, the Oriental myth of the phœnix rising from the ashes, and the Teutonic saga of the Old Women's Mill and the Fountain of Youth.

In the course of the history of mankind, numberless persons have come forward claiming to be able to fulfill this desire, to make true this dream. In Old China, it was the sect of the Taosses with their secret potion of Kin-Tan, which was said

to endow one with eternal life. In Europe, it was Count de St. Germaine with his "elixir of life"; Graham with his "celestial bed"; Boerhave with his "Gerocomy," which already had been practiced by the old Hebrews and Romans and which is based on the theory that old men surrounded by youths would be rejuvenated simply by living in an atmosphere of youth. And last, but not least, there is Ponce de Leon who searched Florida for the Fountain of Youth.

There was an inexhaustible number of quacks and unworldly dreamers until, finally, during the second half of the nineteenth century, the inner secretion of the ductless glands was discovered by Claude Bernard and Brown-Séquard, which enabled the latter to establish the theory of rejuvenation on a sufficiently founded basis for scientific application.

The relation of Brown-Séquard to Steinach is about the same as the relation of Lamarck to Darwin. Lamarck and Brown-Séquard are both forerunners; the first within the realm of evolution, the latter as regards the idea of rejuvenation. Both of them were on the right path, but they did not attain the consummating phases. The finishing touch, the last unassailable, provable evidence based on methodical research, was still missing. In short, there always existed a flaw or imperfection to prevent a definite victory and, as it was left to Darwin to attain this consummation in regard to evolution, so it apparently

fell to the lot of Eugen Steinach to achieve this consummation in connection with rejuvenation.

Just as soon as a theory together with the practical achievements attain this phase of development and popularization, the general public is entitled to receive authentic information on the subject. Revolutionary discoveries—especially when they so vitally concern the course of human life as does Steinach's discovery—cannot be retained as the carefully guarded secret of a limited caste of scientists. Certainly, the great masses cannot be prevented from eventually learning all the facts. But only too often the information reaching the world at large is very much distorted, overdrawn, and even forged. Frequently, exaggerated hopes are raised on insecure foundations, and, just as often, these hopes are destroyed without warrant down to the very root. Subsequently, suspicion and aversion arise not only against the discovery itself, but against science as a whole.

For this reason, the responsibility rests with science to spread among the laity the true facts of every far-reaching discovery. In consideration of this duty, I have undertaken to explain popularly, in this book, the present state of rejuvenation possibilities as they are based on Steinach's discovery.

Two years ago, I published a book in German—"Ueber Verjüngung und Verlängerung des persönlichen Lebens" (On Rejuvenation and Pro-



longation of the Individual Life)—and it would seem logical simply to translate this first essay from the German into English. But as the publication of the aforementioned book quite naturally resulted in extensive research work along the lines of rejuvenation, and in numerous controlling tests and extensions of Steinach's original experiments, my first book very soon became antiquated to such a degree that a revision based on the original compilation of the material would have been difficult.

To justify a thorough rewriting of the book, I need only direct the reader's attention to the extraordinary multiplication of clinical rejuvenation cases since the publication of my first essay on the subject. While engaged in writing this first book, scientific rejuvenation was based almost exclusively on animal experiments. The application of the Steinach Method on man had just begun to show signs of success and was rightfully subjected to innumerable objections. Today, the situation is entirely changed, as is proved especially through the number of cases in the clinical supplement of the present publication. In contrast with the illustrations in my former book, animal experiments are in many respects supplanted in this present volume and are crowded into the background in favor of the enormous progress and improvement of the surgical treatment in men and, of late, in women also.

Thus, with the aid of friendly advice, I came



to the conclusion that a new compilation of the whole subject would bring more satisfactory results than a mere revision of the German edition, which would never have entirely fitted into present-day American conditions and necessities. However, a number of arguments which justified the publication of the German edition also hold good regarding the current American publication. These may be stated as follows:

Firstly, it seemed reasonable to conclude that a book from the pen of a collaborator with Steinach would be quite welcome—of a co-worker who observed the development of Steinach's discovery with his very own eyes; an eye-witness who knows the actual specimens and does not have to depend on description alone.

Secondly, I deemed it feasible to enliven a popular presentation of the subject with illustrations, which, as far as I know, had not been previously done. In the present volume, thanks to obliging fellow students and surgeons, I am able to submit actual photographs of rejuvenated men, showing in each case the patient before and after the Steinach Operation, thus enabling the reader, by means of comparison, to draw his own conclusions.

Thirdly, a good deal of the present-day literature on the subject of rejuvenation belongs to a class of "literature" scarcely higher than that which, to a certain extent, caters to the same audience to which frivolous and vapid plays and

jokes appeal and which believes that rejuvenation is—as Professor Steinach humorously expressed it—the “burlesque-like retro-development,” the impossible transformation of a tottering old man into a dashing youth, even an infant. For this reason, it seemed necessary to approach this newly opened realm of science with fitting seriousness.

Right here, I beg leave to correct a mistake, thus preventing it from spreading among my American audience. The *New York Times*, under date of June 3, 1923, said: “For ten years Dr. Kammerer was associated with the noted professor, Eugen Steinach. . . . It was Kammerer who contributed much of the biological research that resulted in his colleague’s method of rejuvenation for the retardation of senility. . . .” This incorrect statement gave rise, in some quarters, to the conception that not only the biological basic facts, but the discovery of rejuvenation itself, was mine and not Steinach’s achievement.

I wish to make it quite plain here that, as far as the entire subject of rejuvenation is concerned—its suppositions as well as its present-day results—credit is not at all due me. On the contrary, all credit for methodical research work belongs to Steinach, and is Steinach’s mental property. I have never been Steinach’s assistant, but have had the good fortune to work together with him in the Institute for Biological Research

of the Academy of Sciences of Vienna and have been favored with his friendship and full confidence. I merely took lively interest in his research work right from the beginning; and, in the course of time, I had occasion to observe many a result which remained hidden to others for quite some time.

Steinach and I together published a treatise on "Klima und Mannbarkeit" (Climate and Virility) which, however, has little to do with the rejuvenation problem. This publication, which is signed by the two of us, contains the breeding experiments and microscopic anatomical research work supplied solely by Steinach, while it fell to my lot to fit these facts into the general scope of biology, to supply controlling cases from the tropical fauna, and write the supplementing anthropological part of the book.

My collaboration on Steinach's life work is generally limited to popularizing and compiling presentations of his findings, whereby these findings, first known to a comparatively small circle of colleagues, eventually became the property of the general public, thus bringing to Steinach the understanding and the credit he rightfully deserves. What Steinach thinks of my most humble achievements may be deduced from a letter of his addressed to me, the following part of which is quoted below Steinach's picture: ". . . You have greatly advanced our research work . . . and to me personally you have rendered a service

in more than one way. Because of your lucidity, many things became clearer to me. I am now able better to observe and apprehend the intricate biological connections. . . ."

May this quotation be a motto and a message of godspeed for my present publication! May the present publication accomplish within a wider scope that which, according to the above quotation, a celebrated savant ascribes as its merits!

But I would not have been able to achieve this goal without the unselfish, devoted collaboration of a number of helpful friends, among whom Dr. Harry Benjamin, New York, to whom this book is dedicated, I have to thank for the Introduction and valuable material. To Dr. Peter Schmidt, Berlin, I am deeply indebted for his kindness in permitting me to reproduce the photos of the controlling tests of his highly interesting case No. 6. Last, but not least, my sincerest thanks and most candid appreciation is due Mr. A. Paul Maerker-Branden, for his painstaking translation and intelligent interpretation of my book.

PAUL KAMMERER.

Vienna, November, 1923.

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## INTRODUCTION

It was in the summer of 1921; I had gone up to the beautiful Semmering mountains, near Vienna, to visit Professor Eugen Steinach. After spending a very pleasant day with him, during which he explained to me at length the theory and the fundamental experiments of his method of rejuvenation, I expressed a desire to see his famous specimens of animals that gave evidence of his ingenious work. The Professor consented immediately, telling me that his collaborator for many years, Dr. Paul Kammerer, who was in Vienna at the time, would demonstrate the specimens to me, and he gave me a letter of introduction to him. The next day I met Kammerer. Attired in a well worn laboratory coat, he was working all alone at the Biological Institute, which the Viennese call the "Vivarium." Its spacious halls were almost empty and deserted, and Kammerer's lonely scientific work greatly impressed upon me the dire need of Austrian science after the World War. I found the doctor to be a very impressive, serious man. In his exact scientific manner, he pointed out to me the famous specimens of those guinea pigs whose sex had been changed by Steinach's ingenious methods, and

others that had been rejuvenated, and others again which proved beyond doubt the determining influence of the generative glands on the sex development of these animals.

I met Kammerer several times after that—not only that year, but also two summers later—and was again and again impressed by his great sincerity and devotion to his scientific work, not only in his own line of biological research (i.e., the Inheritance of Acquired Characteristics), but also as Steinach's collaborator, whose great achievements he always emphasized.

Little did I dream at that time that I would ever be in the fortunate position of writing the introduction to his first book published in the United States. There is certainly no one more competent to write on Steinach's achievements than Dr. Kammerer, because there is no one who knows the subject more intimately and who is more convinced of the importance, truth, and reality of Steinach's life work.

In discussing the subject of rejuvenation, the layman is mostly interested in the question: What will the Steinach Operation do for me? As a physician I may be permitted to answer this question from a clinical point of view. Broadly speaking, the Steinach Operation strengthens the endocrine system.

What does that mean?

On account of the inter-relationship of the different glands with an internal secretion and the



DR. PAUL KAMMERER  
University of Vienna



influence these glands have over the nervous system, the strengthening of the glandular system will result in a reënergizing of the physical and mental capacities. Naturally, such a strengthening should be resorted to if a glandular weakness or inferiority exists.

What, now, may be the cause of such weakness or inferiority?

If we enumerate these causes we will have the logical reasons for the performance of the Steinach Operation or treatment. A weakness of the endocrine system may be caused by three principal factors:

I: A congenital, inherited inferiority.

In these cases the Steinach Operation could be performed on relatively young men, or the X-ray treatment applied to relatively young women.

II: A weakness through overwork.

Perhaps this forms the largest group and is one in which Americans will be mostly interested.

These men and women who undergo the treatment are often in the prime of life, but overwork has undermined their health, exhausted their glandular system, and aged them prematurely.

III: Weakness through actual old age.

Here, in very responsive cases, a real rejuvenation may occur. Here the progress of senility can be retarded; sometimes even more than only "within modest limits," as Steinach so conservatively expressed it.

There is naturally no sharp borderline between

these three groups. One will frequently merge into the other.

Like any startling discovery, rejuvenation in its different phases is now quickly becoming public property. Not only are medical journals, in articles and editorials, discussing the subject, but the daily newspapers, as well, have become deeply interested—some, unfortunately, from a purely sensational point of view; others, of a more serious type, from the social and economic standpoint. The stage and literature have also begun to exploit the subject in its modern realistic form, where formerly more fantastic ideas prevailed to express the age-old longing for a renewal of youth. This longing is, and always has been, so intense that the faintest ray of hope is immediately magnified, and exaggerated—the wish being father to the thought. Disappointments are therefore bound to follow, unless the limitations as well as the possibilities of modern rejuvenation methods are known.

This knowledge Kammerer clearly conveys to the conscientious reader of his book. Let every reader, therefore, be a conscientious one.

HARRY BENJAMIN, M.D.

New York,  
November, 1923.

REJUVENATION AND THE PRO-  
LONGATION OF HUMAN  
EFFICIENCY





# REJUVENATION AND THE PRO- LONGATION OF HUMAN EFFICIENCY

## I

### AGING

AGE implacably attacks us, at least so it seems. The organs of our body are being used up; metabolism (the process of assimilating food), and blood circulation become sluggish. Remnants of insufficient metabolism impede the proper functioning of vital organs by clogging the tissue, partly in a mechanical way, partly by chemical reaction. Auto-intoxication, developing slowly but constantly, paralyzes the tissue, penetrating into its infinitesimal parts—the microscopic cells. The most sensitive tissues in this way are eventually destroyed, and are only incompletely replaced by other less vital tis-

sues, mostly connective. Because of this general atrophy of tissue, the bodily organs are reduced in size and, as each one shrinks by itself, the body in which they constitute vital parts also shrivels. Wrinkles appear, shoul-



LOWER JAWS

Left, from a Young Adult; Right,, from a Senile Individual, Illustrating How the Various Organs of the Body Shrink with Age. Note Reduced Size of Toothless Jaw of Senile Individual Which Condition, However, Is not Due to the Fact That Teeth Are Lost.

(Lipschütz)

ders are bent, the whole posture becomes stooped.

The organs are not only reduced in size, but they also tend to harden and, as a result of the proliferation of connective tissue, to grow less elastic. Moreover, calcium becomes imbedded in the walls of the arteries and a process generally known as hardening

of the arteries sets in. Though connective tissue and calcium strive to replace the loss which the different organs suffered of their own substance, they prove absolutely inadequate to overcome this shortage. As soon as the loss of the organs' original substance becomes too marked and its replacement by substance not their own is too great, the parts of the machinery of life thus affected are put out of commission. In such a case, symptoms incidental to aging, manifesting themselves in certain tissues (especially in the nerve tissue of the continuation of the spinal cord—the medulla oblongata—where respiration and the pulsation of the heart is regulated) have brought about death.

How then is it possible at all that remnants of one's own process of metabolism are able to accumulate to such a degree and clog the tissues? Apparently nature has carefully provided for the purification of the body. The coarsest waste matter is excreted by way of the alimentary canal. Refuse or finer substance is expelled by way of respiration and with the

assistance of oxygen. Kidneys and sweat glands destroy impurities through chemical reaction. But all these expedients prove to be insufficient in the long run. They may be able to postpone to a lesser or greater degree an accumulation of unabsorbed sediments, but they can never stop this accumulation altogether.

The question now arises as to whether we can come to the assistance of nature, working so imperfectly in this case? Is there a possibility of improving the conditions of those organs and glands which take care of digestion, excretion, respiration, and the general purification of the body? In short, could we not improve metabolism in general?

## II

### CAN AGING BE COMBATED?

AS a matter of fact, medicine has never striven towards any goal other than the combat of age. Everything medicine tries to accomplish amounts practically to nothing else than an attempt to prolong life. And as metabolism is the most elementary necessity of life, all medical measures amount to one thing—to improve metabolism and keep it going. One of the first questions the physician asks a patient pertains to his digestion. He then uses the stethoscope to examine heart and lungs, and makes the necessary analysis of the urine. The physician is mostly concerned with the condition of these essential purifying organs of the body, as these organs have to be in the best of condition or restored to perfect condition as soon as possible, if the health of the patient is to be regained at all.

According to a saying of Seneca, the great Roman philosopher, (*"Senectus ipsa morbus"*), "Age itself is a disease." If we admit that the process of aging—be it ever so slightly perceptible—can be retarded, if we agree that aging and dying are brought about by a progressing imperfection of metabolism which could be combated by perfecting this most vital process of our body, we admit implicitly that "natural aging" and "natural death" occur prematurely and are "unnatural," as paradoxical as that may sound. Tissues and organs could remain in working condition much longer. They do not stop functioning because of an inevitable law, nor because their vitality is exhausted like the resilience of a watch spring that has not been rewound in some time. They cease functioning because there is a deplorable absence of "teamwork" between the different organs. Due to this lack of coöperation, the system is overcharged with more poison than it can absorb and excrete, and in this way vitality is reduced and life is eventually brought to a standstill.

The correctness of this conception is proved

by two outstanding achievements of modern biological research: first, by transplantation; and secondly, by so-called tissue culture.

Transplantation consists of an experiment of implanting into a living body pieces of tissue (fragments of the skin or of any one of the several glands) removed from a body immediately after death. While the dead native body is already in a process of progressing decomposition, these fragments will blend with the living foreign body and continue to function. The vitality of the new abode of these tissue fragments favors their metabolism and thus makes for a more thorough purification than in the diseased and aged body from which they were taken. This goes to prove that the vitality of tissue as such does not necessarily have to be exhausted when a body, as a whole, is unable to continue living.

By tissue-cultures, we understand a different experiment. Again diminutive fragments (of the skin, spleen, connective-, muscle-, nerve- or other tissues) removed from a body immediately after death, are preserved in a drop of frequently changed blood serum, and



kept in an incubator at normal blood temperature (98.6 F). These fragments will continue to grow because their metabolism is so much better than that of their native body; as they are frequently rinsed with a weak salt water solution, an accumulation of metabolistic poisons does not occur. For this reason, these tissue-cultures continue to live in spite of the decomposition of their native body. They even grow now, whereas, when still part of that body, atrophy (a wasting away from want of proper nourishment) had already set in.

It is not at all surprising that, after having prolonged the life of parts of the body beyond those boundaries apparently set by nature, the question arises: Could not a similar success be achieved if all parts of the body would remain in their natural connection? Could not a prolongation of vitality, which is an achieved fact as far as parts of the body are concerned, be applied to the body as a whole?

At first glance, earnest endeavor along these lines seems to be quite a thankless task, as it would apparently only tend to prolong the

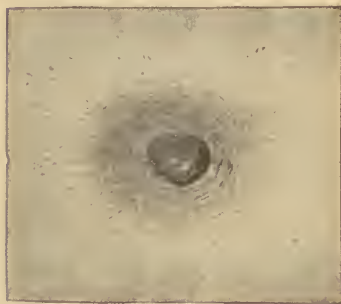




CONCAVED PREPARATION  
SLIDE AS USED FOR  
TISSUE CULTURES

*Upper Picture, Full View; Lower  
Picture, Side View with Cover-  
Glass Attached. Note "Culture in  
a Hanging Drop of Blood-serum"*  
Inside of the Concavity.

*(Carrel)*



TISSUE-CULTURE IN A HANG-  
ING DROP OF BLOOD-SERUM

*(Greatly Magnified)*

In the Center the Original Tissue  
Fragment, Now Decomposed, Sur-  
rounded by Circular Layers of  
New Growth. The Concentric Cir-  
cles Consist of Layers of New  
Growth as They Develop After  
Each Rinsing of Tissue Fragment  
and the Changing of the Nourish-  
ing Blood-Serum.

*(Carrel)*



decay of a body; would only, so to speak, make for "the conservation of a living corpse." In this light, prolongation of life does not seem, as Hamlet says, "a consummation devoutly to be wished." But fortunately, detached and transplanted fragments of tissue not only survive the native body, but also continue to develop. Improved metabolism rejuvenates these tissue-cultures and even re-develops them into a stage of almost embryonic condition, the very condition that once before rendered their growth and normal development feasible.

The distinct desire to regain youth was always underlying the various experiments carried on in the interest of the prolongation of life. Experiments along this line are most probably as old as mankind, certainly as old as civilization. It has been one of the fairest dreams of mankind to retain and reclaim youth. The folk lore of all the nations is full of this longing for eternal youth, full of a yearning for resurrection and immortality. Quacks and charlatans exploited this longing, and to them people flocked just as eagerly as

they flocked around alchemists and astrologers.

But what those quacks and charlatans had to offer to a credulous crowd was nothing but stimulants, certain draughts that accelerated pulsation, intensified the blood circulation, and in this way tended to purify the tissue. A distinct feeling of returning vitality was created by this, but only too soon reaction set in and there was nothing left of this temporarily regained strength. It would even leave the patient more exhausted than he had been before the "cure."

Another means to the same end consisted in the administering of laxatives which, of course, could do no more than rid the body of intestinal poisons. As absurd as those superstitions may have been that promised return of youthful strength, an iota of truth underlay the theory of stimuli as well as that of laxatives. It was clearly understood how essential it was to cleanse the system of the by-products of metabolism. The cleansing of the organism, internally as well as externally, is the starting point for every endeavor to prolong life and intensify its efficiency.

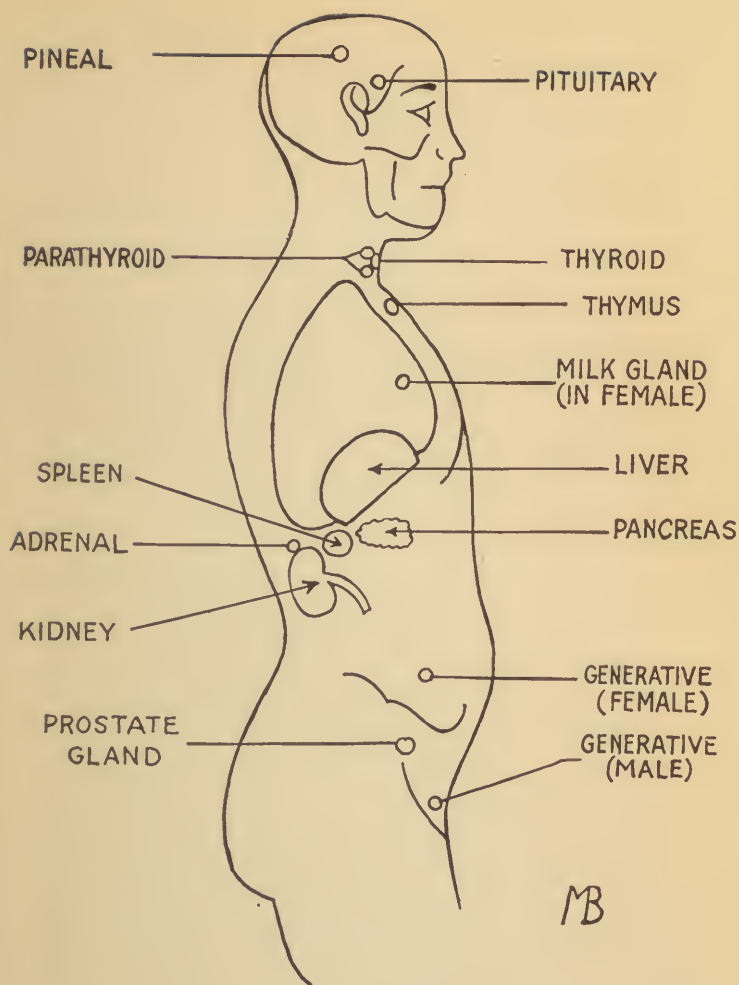
But the greatest damage inflicted by these quacks and charlatans with their deceptive cures consisted in a general discrediting of all serious and honest attempts to solve the problem of rejuvenation. Savants of all times and in all parts of the world, who refused to resign themselves to the inescapability of aging, have been sneered at and mocked. But the progress of true science cannot be stopped! In spite of attacks from their own ranks, valiant scientists have striven, and are still striving, to forge ahead towards this fairyland of Ponce de Leon's dreams. And why should not the human mind, which has learned to harness the heaven's lightning and to conquer floods, which has made steam and electricity its obedient slaves, eventually succeed in attaining supremacy over its own life? And why should not the inventive human mind, which has found any number of ways and means to fight death in its various forms, eventually succeed in combating the process of aging to such a degree that useful life will be prolonged far beyond its present length of years?

### III

#### INNER SECRETION AND DUCTLESS GLANDS

MODERN methods of rejuvenation are based on a number of organs which, until only a short while ago, kept the scientist puzzled. We now know that these organs play a very essential part in the growth and purification of our bodies, and are universally known as "ductless glands"—that is, glands with an internal secretion, also called "endocrine glands."

To enumerate a few of them: The Pineal Gland, located in the brain; the Pituitary Gland (Hypophysis) at the base of the brain; the Thyroid Gland and behind it the Para-Thyroid Glands, at both sides of the larynx; the Thymus Gland, which rests on the trachea, commonly known as the wind pipe, at the spot where the latter forks into the bronchial tubes; the Adrenal Glands, on top of the kidneys, and some other glands. They all have



SCHEMATIC CHART  
Of the Endocrine System





the characteristic of discharging their secretion into the system directly—that means without passing the secretion through a duct or channel. As there is no vessel in the body where the secretion could accumulate, the secretion itself is invisible. We assume from the structure of the organ only that it is a gland. We also see, under the microscope, that the cells of the gland tissue secrete something; but we do not see enough of what they secrete to determine the color, consistency, and other characteristics of the secretion.

The sweat and sebaceous glands, on the other hand, carry their visible and well-known secretions through special excretory canals to the skin. The stomach and salivary glands convey theirs in the same way into the alimentary canal. Likewise, the liver transmits its secretion, which is stored away provisionally in the gall-bladder, by means of the bile-duct. But if these aforementioned organs are genuine glands, only “glands without an excretory duct,” what then becomes of their secretion and where does it finally go?

Now, these ductless glands, like all other

organs, are necessarily connected with the blood circulation. They are surrounded by blood and lymph vessels which support them with nourishment and oxygen and at the same time carry away the products that originate in the glands. To differentiate them from the plain external secretion (for instance of a sweat or saliva gland) their function is named "internal secretion," or briefly "incretion."

The internal secretion necessarily changes the composition of the blood as it hurries to distant parts of the body to take care, everywhere, of the distribution of nourishment and oxygen and to carry away by-products and carbon dioxide. Naturally, the inner secretory products contained in the blood will have an influence on all those organs that are nourished by the blood. Therefore, the products of the ductless glands are not without consequence for the health and growth of the rest of the body. Sometimes their influence promotes health, sometimes it retards; but always as long as a normal, healthy balance prevails in the system, they work in behalf of harmony and beauty.

During the last decade, biological research has revealed to us a new world of wonder as we come more fully to an understanding of the endocrine system—the system comprising all the glands of internal secretion. Though these glands seem to be without a means of discharge, they communicate with each other and with all the other parts of the body by means of the hormones which are contained in the circulating blood. This appellation is applied to the internal secretion of any gland and is derived from the Greek, meaning “something that spurs into action.” As a matter of fact, these hormones not only stimulate the various parts of the body, but they also play the rôle of messengers within the body. Until biological research discovered this property of the hormones, we knew of only one agent that made for unification in the working of the body; namely, the nervous system. In the polyglandular system we came to know a second means of interchange; namely, a system working on many glands with its effect based on chemical reaction.

How dwarfed a human being remains if

his thyroid gland does not function properly! If only the natural physical growth of the individual were dwarfed, it would not be so very bad; but there is one organ which must be especially well irrigated with the thyroid secretion (Thyreodin) in order to mature properly, and that is the cerebrum. What is the good of the most ideal mental tendencies latent in the cerebrum, if the quantity and nature of the thyroid secretion does not suffice to awake them to action?

The thyroid gland, on the other hand, will attain its normal size and power only if the generative gland achieves normal development. Together these two glands—the thyroid and the generative—control another organ with inner secretoric capacities; that is, the pituitary gland on which depends the growth of the skeleton, as well as the accumulation of fats. Another organ of this nature is the thymus gland which has effect on the body only during the years of childhood, and is controlled and ultimately destroyed by the generative and thyroid glands. The thymus gland is slowly absorbed by the maturing body

and in normally developed individuals is scarcely noticeable any more around the time of complete maturity. Friends and foes, therefore, find themselves within the "Incretory Association." Assistance and antagonism both are contributory (as long as the health of the body is not disturbed) in reaching the final goal which is already fixed as the duty of the ductless gland system; *i.e.*, to achieve the harmony of the parts and to build a perfect whole from them.

It is not always an easy matter to distinguish between ductless glands, that is, glands with an inner secretion (incretion) and glands with an external secretion. Quite often it happens that a gland which possesses visible ducts at the same time pours certain secretions into the body through invisible channels. One of these glands is the pancreas (commonly called the "sweetbread"), a whitish, conglomerate gland of irregular shape, situated deep in the abdomen beneath the stomach, and pouring its secretion into the alimentary canal during digestion. It is one of the most important of the digestive organs.

## IV

### THE GENERATIVE GLAND

A SECOND example is the generative or sex gland, also called gonad. The human gonad (which is the testicle in the male and the ovary in the female), contains two principal groups of cells. The first group performs the function of external secretion, *i.e.*, furnishes the sperm cells—those elements which are necessary for the propagation of the race. These sperm cells are discharged from the body by way of a canal called spermatic duct or Vas Deferens.

The second group of cells are the so-called interstitial or Leydig cells, in their entirety called the interstitial gland (or, by Steinach, puberty gland). These cells produce the internal secretion, the gonadal hormone, which is most essential for the individual's normal sex characteristics, thus differentiating male



and female in their physical as well as mental make-up. This gonadal hormone is also of highest importance for the general well-being, as we will hear later on.

The question is not yet solved as to whether a definite differentiation is possible between the glands that generate only external secretions and those which, being mixed glands, possess visible ducts, but at the same time pour their secretions directly into the blood or lymph. This is especially doubtful as far as the generative gland is concerned, the question culminating in the argument as to whether the hormone is produced by the generative tissue or by the interstitial tissue. It is by all means possible that the generative tissue produces hormone, together with sperm cells, and it is also possible that the interstitial tissue originates from atrophied generative cells; but the latter is certainly not in a condition to produce mature sperm cells.

As far as incretion as such is concerned, these two most important tissues of the generative gland are able to replace each other. The normal generative gland quite often is

deficient in interstitial tissue. As a matter of fact, this gland is sometimes so lacking in this substance that it seems hardly possible that it could still work properly. On the other hand, sometimes disturbances develop within the body which displace, temporarily or permanently, the generative tissue. In a case like this, the interstitial tissue replaces the generative tissue. Whenever this happens, no decrease in the incretional effects of the generative gland is noticed; on the contrary, very often the effect of generative glandular increment is intensified. It seems quite possible that in a case like this the interstitial tissue alone, or almost alone, assumes the incretoric function of the entire generative gland.

The question whether the incretoric function is the task of the one or the other of the two different tissues of the generative gland, and to what extent the one or the other is the tissue which produces the hormone is a question which, within the general argument about the "rejuvenation question," plays quite a rôle. As a matter of fact, this question has assumed such proportions that it is becloud-



ing the issue of rejuvenation, as such, in a very unnecessary and futile manner.

That pioneer of rejuvenation, Professor Eugen Steinach of the Biological Institute of the Academy of Sciences, University of Vienna, assigns the leading part of the incretoric function of the generative gland to the interstitial cells, which he calls in its entirety, the puberty gland. Professor Steinach derives his belief from his long years of research work, during which he gradually and systematically arrived at the possibility of rejuvenation. Others dissent from his opinion that the interstitial tissue plays the leading part in the production of the hormone, and in the heat of the argument about this unimportant question, his opponents forget altogether that the essential thing is not which part of the generative gland brings about rejuvenation, but rather the fact that rejuvenation is actually brought about by Professor Steinach's Method.

We are not going to enter into an argument regarding the "Theory of the Puberty Gland"; that is a question which belongs to

a scientific forum. It is, perhaps, sufficient to say that so far as the question of rejuvenation is concerned, the rôle that is assigned to the interstitial tissue of the generative gland is greatly overrated. In connection with its incretoric effects, we are going to consider the generative gland as a whole. It is not necessary to waste time over the question as to which of its components plays the leading and exclusive part (under normal and abnormal conditions) when it comes to the production of internal secretion.

## V

### THE REJUVENATION PROBLEM

TO recapitulate briefly: what happens to the organs of life when age approaches? They become reduced in size; they shrink or wither; they lose more and more of their very own substance, because the growth of their cells ceases and the cells themselves degenerate. The invasion of proliferating connective tissue gradually develops into a real calamity, because it hardens the organs and makes it impossible for them to function properly.

Together with the deterioration of these organs of life, the ductless glands wither. Remembering that it is the task of the ductless glands to purify and vitalize the whole body, the conclusion is obvious that, with the advancing of age, the simultaneously progressing deterioration of the ductless glands is so much more serious as it hastens the termination of life. Another very important issue is

the fact that all the ductless glands, even though one or the other of them may oppose each other, belong together and that every one of them is important to the general well-being of the whole body. If one of these organs is diseased, all the other organs suffer in turn. If one of them is successfully restored to health, all the others will participate in this benefit.

It seems quite obvious to apply this theory to the symptoms of advancing age as exhibited in the ductless glands. If in only one of these so essential organs the symptoms of age could be successfully combated, if a new and counter-impetus could be given to an already ceasing or retrogressing development, all the other organs would most probably participate in the improvement. New life would flow from the regenerated gland to stimulate all other glands and ultimately, through the glandular system as a whole, to permeate the entire body. The main questions, then, are: How shall we best stimulate a ductless gland; and which of all the glands is most easily approached and, with the least complications, put to use in the direction of rejuvenation?

## VI

### STEINACH'S FORERUNNERS

THE generative gland is, at least according to the present dictum of science, the most easily approached for the purpose of reënergizing an aging, or aged, body. As one of the very first who studied the laws of inner secretion and valued its phenomena rightly, Brown-Séquard, about the end of the eighties of the last century, undertook to test the hormone of the generative gland with respect to its value as a means of rejuvenation. Brown-Séquard prepared an extract of the generative gland of an animal and, using himself for his experiments, injected this extract into his own body.

He soon observed remarkable phenomena of rejuvenation. His muscle power increased, his brain functioned more quickly, and his endurance in general and in every respect was greatly enhanced.

When in 1889 in the "Comptes Rendus de la Société Biologique de France" he published his findings, they created so tremendous a sensation that would-be "rejuvenates" simply besieged his house in such a manner that he had to flee to London before the rush.

It is a sign of the times in which we live that today when experiments are continued with much more fitting means than the French savant had at his disposal, nothing approaching the sensation in Paris in 1889 is created. That is partly the fault of the skepticism usually incurred by sensational discoveries, and the indifference of the public which has so often been disappointed when "miraculous cures" made their rounds through the daily press.

Brown-Séquard was on the right road with his experiments, but any extract injected into the body will be assimilated very soon and, for this reason, the effect of an injection can hardly ever be more than temporary. It is quite plausible that repeated injections may bring about something like permanent improvement for the simple reason that, by stim-

ulating the most deficient gland and improving its condition, the whole glandular system in turn is improved and this again will ultimately put the first gland in a normal condition, so that further injection can be dispensed with.

## VII

### THE TRANSPLANTATION OF GLANDS

IT stands to reason that an improvement of the ductless gland system of the body could be brought about with much greater efficiency, if one would succeed in reviving the deficient ductless gland so that this gland itself would furnish the body with the vitalizing incretion, thus dispensing with injections which sometimes are bothersome and hard to gauge. Working on this theory, science gradually arrived at the conclusion that transplanting of glands would be much more efficient than the injection of incretoric substances. A youthful gland was simply to be transplanted into the body, to make up for the deficiency of a degenerated gland.

There are two different kinds of transplantation: Autoplastic transplantation, *i.e.*, transplantation within the same body, and he-



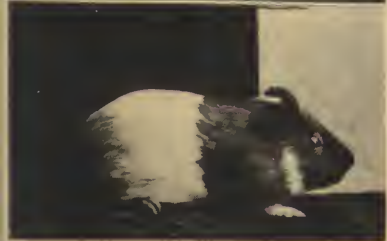
teroplastic transplantation, *i.e.*, transplantation from one body to another. While the expression transplantation is usually applied to the performance as a whole, the term implantation is used when referring to the actual inserting of the transplanted organ into its new location.

Professor Eugen Steinach, before he was ever interested in the rejuvenation problem, was the first scientist to prove on mammals that insufficiency of glandular incretion can be overcome by transplantation. To test and prove his belief, he deprived young rats and guinea pigs of their generative glands, at the average age of about four weeks. It soon became apparent that the absence of these important organs from the bodies of the animals checked the development of certain other organs. Animals robbed of their generative glands remained in a stage of immaturity or even retrograded into immaturity, if they had already passed this stage. However, as soon as these same detached glands were replaced, the symptoms of under-development or even retrogression passed away both in the male

and in the female. If the rats and guinea pigs were left without a generative gland until the symptoms of this deficiency showed and then foreign glands were implanted, the symptoms also disappeared, even if they had been observed in the animals for quite some length of time.

But what happened when, at the time of restoring the glands to the animals, these glands were interchanged—that is, that the male generative gland was implanted into the female and vice versa?

Steinach discovered that the sex of the animal always responded to the sex of the generative gland; that the female implanted with the male gland will be a male with all of his characteristics; and that the male implanted with a female generative gland will develop into a full-fledged female. By implanting a male and a female generative gland simultaneously into the body of an animal, Steinach and Sand produced hybrids (hermaphrodites). The same results were achieved by Moore and Pézard by implanting into a normal male the generative glands of a female or



### FEMINIZING GUINEA PIGS (Side View)

From Top Down: (1) Normal Brother; (2) Normal Sister; (3) Castrated Brother; (4) Feminized Brother



### MASCULINIZING GUINEA PIGS (Side View)

From Top Down: (1) Normal Brother; (2) Normal Sister; (3) Sister With Her Ovaries Extirpated (castrated); (4) Masculinized Sister.



implanting the generative glands of a male into a normal female. In the course of these experimentations, the scientists succeeded in bringing about all the intermediate stages between male and female.

These experiments shed light on three different and very important facts: First, they proved that it is not at all necessary to reinstate a detached gland at the very spot from which it was removed. Not only will a gland blend with the foreign body, it will also become part of its native, or the foreign, body if reinstated at a spot which is not the proper one. The effect will not only show under comparatively favorable conditions, but very often the transplanted gland will even improve and thrive at the foreign spot in a foreign body—a fact that cannot be observed in other than glandular organs.

Dr. Edward Uhlenhuth, of the Rockefeller Institute, New York, proved that he could remove an eye from a toad and graft it on a foreign spot; for example, on the neck where it will root and grow with the rest of the body. But it will never be of any use as an eye un-

less it is reinstated into its proper place (in this case, into the socket of the eye, as Kopyani proved) because only there can it connect with the proper nerves and attach itself to the right muscles. As far as a ductless gland is concerned, however, the attachment to the nervous system is of no importance. It is merely essential that this gland shall be encased in and penetrated by blood vessels. Then it is not only nourished by the body, but at the same time is able to pour its secretion into the blood which will carry it all through the body, with a stimulating effect on all the organs. A part of the body which lends itself admirably to the implanting of generative glands is the peritoneum, on account of its general texture.

It was proved also by the experiments on rats and guinea pigs that the transplanted generative gland changes in its composition. That is to say that the generative and the interstitial tissue undergo changes as far as the quantity of the one and the other is concerned. Through transplantation, the greater part of

the very sensitive generative tissue is destroyed; and to the same extent to which this generative tissue is destroyed, the interstitial tissue gains ground within the generative gland. As the interstitial tissue is possessed of incretoric properties, as pointed out before, the function of the generative gland as a ductless gland is not merely undisturbed; it is quite frequently even intensified.

Finally, by these experiments on rats and guinea pigs, the road was opened for the application of the method of transplantation on man. In quite a number of cases, generative glands which had been lost in the Great War or through accidents were replaced, and in this way improvement or even recovery of a patient was brought about. Similar improvements and cures were achieved in cases where the generative gland had to be removed on account of being tubercular. In other cases, through the implantation of a generative gland, congenital deficiency of this gland was overcome. Among the scientists who did remarkable research work in connection with



transplantation are the American surgeons, Lydston, Stanley and Kelker; Lichtenstern in Vienna and Muehsam in Berlin.

In cases where congenital deficiency manifested itself in an hybridal condition of the generative gland, where the physiological make-up of an individual was contrary to his psychological make-up, and where intermediate stages of sex existed, Seinach, Lichtenstern, Muehsam, and Pfeiffer succeeded in correcting this abnormal condition by replacing the deficient generative gland with a normal one.



## VIII

### REJUVENATION FROM FOREIGN SOURCES

AS mentioned before, the experiments of Steinach, which were the first to open the road to these far-reaching possibilities, were performed on young, immature rats and guinea pigs, which at the time of experimentation had not yet achieved procreative powers. It seemed quite logical to try the same experiments on rats which had already lost their procreative powers, that is on rats which were senile. The extension of these experiments seemed so much more logical as some, not all, of the symptoms incident to the loss of the generative gland strongly resemble the symptoms of old age. The conclusion did not seem far fetched at all, that the same operation which cured the effects of the loss of the generative gland could be applied successfully to

overcome symptoms of aging; the heteroplastic transplantation of youthful generative glands bringing about a new youth. Soon enough Steinach, experimenting with rats in this case; Harms, experimenting with guinea pigs and dogs; and Voronoff, trying the transplantation method on rams, achieved miraculous rejuvenation effects.

Senile female rats, operated on by Steinach, were again able to bear young, even though they had been completely sterile for a long time. The generative glands (ovaries) grafted on them revived their own ovaries, which had withered long before, and their generative tissue again developed active germ cells. Female rats rejuvenated in this way behaved exactly like young mothers. They built nests for the care of the expected offsprings and were in the best of condition to nurse their young sufficiently. This shows that in the rejuvenated rats, numerous instincts and faculties were resurrected that had been practically dead for some time.

The young rats grew to be especially well developed specimens, invested with normal

procreative powers. They gave no evidence that they were the offsprings of "reconditioned" mothers.

Harms operated on a male dog, seventeen years old, which was almost in a dying condition when the operation was performed. Some time later, he was able to jump out of a box which was given him to sleep in, the sides of which were about eighteen inches high.

His loose teeth grew firm again and he could gnaw hard bones. His growth of shaggy hair improved to a surprising degree and numerous sebaceous tumors disappeared. The dog once more proved himself well-trained; kept his box clean, and was at all times prepared to defend himself although he had been exceedingly meek before.

Now the very pertinent question arises: Could these transplantation experiments, with rejuvenation as the distinct aim, be applied to man? In a number of cases, Lydston, Voronoff, and Lichtenstern succeeded in overcoming symptoms of old age in men by implanting reviving generative tissue. To alleviate complaints incident to the change of life in

women, several celebrated gynecologists—among them Morris, Glass, Dudley, Cramer, and Kroenig—successfully resorted to the transplantation of tissue of the ovaries. But all the applications of this seemingly obvious method of heteroplastic transplantation encountered great difficulties. In the first place, there is little doubt that aged tissue lends itself none too favorably as a basis for grafting foreign tissue. In the majority of cases, youthful tissue implanted on aged tissue does not blend with the latter but withers and is destroyed.

In the second place, in connection with the application of the transplantation method on human beings, the question arises: Where to get youthful organs to stimulate aged and aging ones? The very same difficulty was encountered when, as mentioned before, deficient generative glands were to be replaced by efficient ones. Of course, only a very small percentage of mankind suffers from congenital deficiency of the generative gland, and cases where this deficiency is brought about by sickness or accidents are quite rare.

Age, on the other hand, is a disease that nobody can escape. For this reason, enormous quantities of transplantation material would be necessary if this method should be applied generally.

There are, however, a few sources from which to secure transplantation material. For example, in the case of a man whose generative gland has to be removed on account of a faulty position; if this generative gland is normal, it can be used advantageously to improve the condition of some other man suffering from a deficiency of the same organ. Most of the operations performed by Lichtenstern and Muehsam were of this kind but were not undertaken as a means of rejuvenation. Another source of securing transplantation material offers itself if the generative gland of a young man who died by accident, or of a man executed by law, can be obtained and utilized, as has been done by Lydston, Stanley, and Kelker.

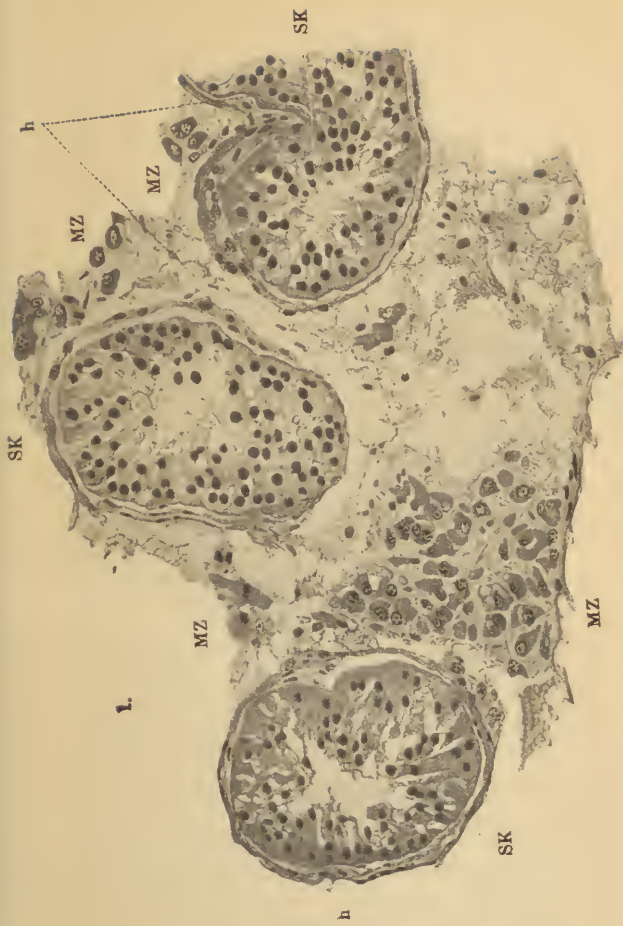
A third source arises if a man in the prime of health offers the needed organ, either from the goodness of his heart to save the life of a

dear one, or sells it for mercenary reasons—this latter method opening the possibility of a despicable traffic in organs. There are known cases where legal papers were actually drawn up for transactions of this kind, and other cases have been mentioned in the press where men were knocked unconscious and then robbed of the long-sought-for organ.

Of course, all the organs which might be utilized for heteroplastic implantations are paired; if one of them is removed the other immediately gets ready for compensatory over-work. However, as will be shown later on, the loss of one of a pair of organs becomes a serious encroachment on the possibility of a later attempt at rejuvenation, and endangers the individual considerably in case of sickness or disease.

Whether the methods of acquiring a human organ to replace a deficient one are ethical or not, whether they are feasible or not, it would eventually scarcely be possible to procure the necessary material if transplanting should ever become general. It would soon be necessary to utilize the organs of animals to replace deficient human organs.





HUMAN MALE GENERATIVE GLAND  
(Greatly Magnified Section)

During the Development of the Body This Gland Did Not Descend into the Scrotum But Was Retained in the Region of the Groin. There It Was Almost in the Same Situation as a Transplanted Gland on Account of Being Exposed to the Pressure of the Surrounding Organs. Therefore, the Interstitial Tissue (Mz) Proliferated at the Expense of the Generative Tissue (SK—Seminal Canals).  
(Steinach)





But this method of rejuvenation presents marked difficulties, in that the farther apart tissues are in relationship, the less likely they are to blend. The best results in blending are achieved by tissues of the same individual. The next best results come from the blending of tissues of different individuals of the same kind. In only a few cases has there been a satisfactory blending of tissue of different kinds. In spite of this handicap, Voronoff has followed this method. After rejuvenating senile rams, he applied his method to man by using monkey glands. It is reported that he achieved remarkable results, and that one of his "rejuvenates" is the Belgian poet, Maurice Maeterlinck. Of course, only time will show whether this method brings about anything like a permanent result.

For the time being, an opinion regarding the possibilities of rejuvenation by transplantation could be based on the following established observations: Steinach's implanting young ovaries into old female rats has proved, as the most important result of implantation, that the aged, original ovaries were stimulated into new activity. There is a probability that,

in cases where the implantation method is applied to man, a similar result could be achieved—that is, that an animal gland, by stimulating the human glandular system, could bring about rejuvenation. And when that is done the animal gland would have exhausted its usefulness; it would not even be necessary for it to be kept intact. Its duties will have been assumed by the organs of the patient and the animal gland may now safely be allowed to deteriorate.

The method of transplantation is somewhat similar to the injection method, since in both cases something is introduced into the body which is expected to be absorbed by the system. The material grafted into the body by heteroplastic transplantation will, of course, persist for a longer time than the substance which is injected, and most probably will work long enough to give the body an impetus sufficient to carry on the beneficial development thus begun.

## IX

### REJUVENATION FROM ONE'S OWN SOURCES

How much more advantageous it would be if, for the purpose of rejuvenation, the body could be made independent of the utilization of foreign matter and substances whose condition is always doubtful and whose acquisition very often is not an easy matter; if the organism could draw on itself to produce the means of rejuvenation out of its own resources. The autoplasmic transplantation of glands is an ideal method of rejuvenation, and the question is still to be settled whether one would not be quite right in speaking of a "rejuvenation from one's own sources" in a case of the transplanting of the patient's own generative gland from its native abode to some other place, say between the muscles of the abdomen or somewhere under the skin.

It has been stated already that the trans-

plantation of a gland—if it only be within the same organism—always results in a certain rejuvenation of that gland. The incretion of this gland is intensified, in turn improving the incretion of the entire glandular system which, in the end, amounts to nothing less than a rejuvenation of the whole body. The difficulty in procuring foreign material for rejuvenation purposes would be overcome if we only changed the location of a patient's own gland.

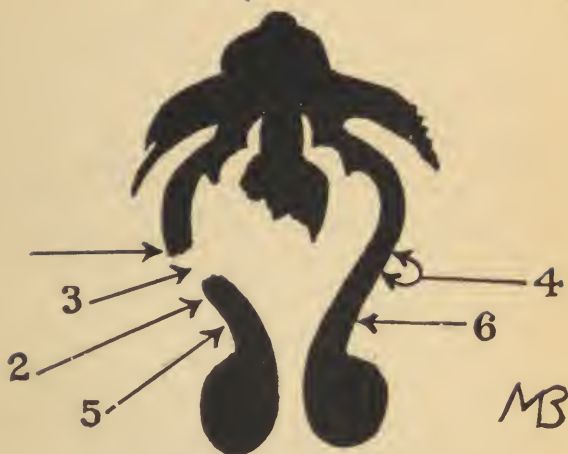
But a new difficulty now arises from the fact that aged, or aging tissue is in itself a very unsatisfactory material. A more serious condition arises when the transplanted gland itself is in an aging, or aged, condition. Not only is this general manifestation of progressing age detrimental to the chances of successful rejuvenation, but the operation as such, being a so-called major operation, would very often overtax an aged patient's strength, since even young patients are often unable to undergo the ordeal. Even though transplantation has been successfully performed on animals, it seems too much of a risk to subject man to an operation of such seriousness.

As explained before, the generative gland begins to undergo a change in its composition as soon as it is transplanted. The generative tissue diminishes while the interstitial tissue expands—"proliferates," as the technical term is. Steinach concluded from this fact (which, by the way, is not uncontended, as has been explained before) that, by means of the proliferation of the interstitial tissue, which starts as soon as the gland's abode is changed, a surplus of vitalizing tissue is created which is necessary to bring about symptoms of rejuvenescence. It was only logical to try to find a way to achieve the same rejuvenating proliferation of the interstitial tissue upon aging and aged people without taking recourse to transplantation.

## X

### THE STEINACH OPERATION

LOOKING around for such an expedient, Steinach quite independently hit upon the idea of testing an operation which had already been performed by such scientists as Bouin and Ancel, but for an entirely different purpose. This operation consists in severing the duct of the generative gland in such a manner that it will not be possible for the severed ends to join again. For this reason, a simple severing of the duct would not be sufficient, because without providing for a permanent separation of the severed ends, they would knit again and the secretion again would be discharged. Another difficulty would arise from the possibility that from one severed end of the duct, the secretion would leak into the abdominal cavity. As it is important that there shall be no discharge of



### SCHEMATIC CHART

Showing Spermatic Ducts of Rat Which Has Undergone Vasoligation. 1 and 2, Places Where the Ligation Was Performed; 3, Resected Part of Spermatic Duct (Vasectomy); 4, Place Where a Second Vasectomy Could Be Performed Which Would Leave the Animal Still Potent, Though Sterile; 5 and 6 Places Where a Third and Fourth Vasectomy Could Be Performed.





secretion whatever, it seemed wise not only to sever the spermatic duct but also to ligate it in two places and thus close this duct permanently. Besides a fragment from between these two places of ligation is removed, long enough to make a union of the severed ends impossible.

The permanent severing of the duct of the male generative gland is a minor operation which can be performed very quickly and without any danger to the patient. It is called "Vasoligature," meaning a ligation (a binding or restriction) of the Vas Deferens, which is the medical term for the spermatic duct and is often referred to simply as Vas. Sometimes the operation is also referred to as Vasectomy, but usually only in cases when the fact is stressed that the operation consists of a resection of a part of the Vas Deferens. Most of the time this method of rejuvenation is called the Steinach Operation, because Steinach was the first to employ this operation with the decided aim to bring about rejuvenation, while his forerunners performed it merely to study the change of tissue texture of the generative

gland, which is brought about by vasoligature. To be sure, the operation had been employed quite frequently—though not always successfully—before Steinach used it, but only to remedy urinary disorders. By order of a court of justice, the operation was performed to sterilize criminals and the insane in a way which would not impair their general health.

Now, it may be asked: How is it possible that a ligation of the spermatic duct of the generative gland brings about atrophy of the generative tissue and a proliferation of the interstitial tissue? Because as soon as the secretion of the generative gland is checked, this secretion is stored up in that part of the severed duct that is still connected with the gland. In this way, more and more secretion is stored up until the accumulating fluid ultimately reaches the generative gland itself where the duct originates. The stored-up secretion induces pressure which makes itself felt at first on the generative tissue itself—the very place where the secretion is generated. In the end, the generative tissue, more sensitive than the interstitial tissue, has to give



GENERATIVE GLANDS OF SENILE MALE RATS  
(*Microscopical Section*)

*Upper Picture* Denoting Senile Condition; *Lower Picture*, After Ligation of Spermatid Duct, in Re-vivified Condition. In the lower picture the Seminiferous Canals (SK) Are Still Intact; aSK—Seminiferous Canals in the Process of Perishing. Interstitial Tissue (P) in the Lower Picture, Rejuvenated on Account of Ligation, Decidedly Better Developed Than in the Senile Gland (*upper picture*), Where Empty Spaces Can Be Detected

Between the Single Seminiferous Canals.  
(*Steinach*)



way to the pressure brought upon it and, quite automatically, this gives the hardier interstitial tissue an impulse to proliferate. This shows that the ligation of the duct of the generative gland (vasoligature), because of the pressure brought to bear upon the gland proper, has achieved the very result contemplated by the transplantation of a gland. But in the case of the Steinach Operation, this result is achieved without changing the abode of the generative gland.

## XI

### EXPERIMENTS ON ANIMALS

EXACTLY as in the case of transplantation, Vasoligature was first tried on animals. Steinach preferred rats for his experiments, as they develop symptoms of old age when only eighteen months old. Even with the best of care, they never reach a greater age than from twenty-seven to thirty-one months. This short life enables the research scientist to gather interesting data regarding aging and rejuvenating within a comparatively short space of time.

With extreme care, Steinach selected the animals for experiments to test the rejuvenating properties of vasoligature. It was not sufficient that a rat was *apparently* old, because a rat with symptoms of age might possibly be a sick animal or one improperly nourished. Steinach insisted that every rat that

was to be used for experimentation purposes had to have a pedigree like a valuable animal for breeding purposes. The rats were raised under his personal supervision. They were carefully registered and had to be cared for painstakingly for a number of months, during which time they were under the strictest observation. But even then, any rat admitted to the rejuvenation experiment had to undergo a number of tests which would demonstrate its senile condition beyond doubt.

One of the tests was a test of courage. For this purpose, an old male rat was brought to face a young one. Two male rats, not used to each other, invariably fight as soon as they sight each other. They stand up and, while squeaking furiously, start to fight. An old male rat proves his age—in the colloquial meaning of that term—by quitting and sneaking away.

Another test was a test of temperament. An old male rat was given access to a cage where a young female rat was housed. Contrary to the interest which any young male rat takes in the fair sex of his species, for the old



male rat the female scarcely held any attraction—certainly not fascination enough to induce the old he-rat to “flirt” and pursue her. The “old man” after a disinterested glance at the enchantress simply walked away.

But more interesting than any other test was the way the rats were tested regarding their physical strength. For this purpose, something that is considered an extreme delicacy to the taste of rats is put on top a tree stump about the size of a chopping block. It is easy enough for a young and strong rat to jump on the stump and make away with the bait, but an old and feeble rat can hardly do more than raise itself on its hindlegs and enjoy the smell of the food. It is indifferent because it lacks the strength to overcome the obstacles, so, quite resignedly, it foregoes the pleasure of the food because of the exertion necessary to obtain it.

Symptoms of old age in rats are evidenced not only in tests like these, but in the appearance of the animal as well. In the first place, old rats are emaciated. There are hardly any fat deposits beneath their skin or enveloping



the internal organs. Intestines and muscles are dried up and bleached, which is not only the result of a lack of fat, but also proves that the animal is anæmic in general. Their coat of hair is shaggy. Mange which attacks young animals only to a small degree, in old animals results in extended hairless spots in the neighborhood of the throat, on the back, and along the thighs. And too, vermin get the best of old rats because, being old, they do not keep themselves as clean as in their days of youth.

But three or four weeks later, after having been subjected to vasoligature, the bald spots are covered with a new growth of hair; the condition of the whole skin improves; and, because the animal is again ambitious enough to fight vermin, it looks much cleaner and better in every way. The first result of the operation shows itself when the animal throws off its hunched carriage; it is again able to raise itself on its hindlegs and its dull eyes become bright once more. The animal is interested enough in its surroundings to sit up and prick its ears. It moves more alertly and develops a better appetite. Eating more food, it gains

in weight; fat deposits make their appearance; the intestines are well moistened; the muscles are more pliable and are not dried up and bleached, manifesting by their reddishness of color an improved blood circulation.

The accomplished rejuvenation is apparent in every organ of the body and in the improved function of these organs. This is especially true of the ductless glands which, like all the other organs of the body, in old rats are withered and shrunken, regain their normal size and resiliency. Up to now, this has been proved with certainty, as far as the thyroid gland and the pituitary gland are concerned, with research work in this direction still going on.

In a previous chapter, the importance of the ductless gland system and its relation to the whole body was discussed. In connection with this, it seems fitting to repeat here that the miraculous rejuvenation accomplished in old rats is based not only on the improvement of one gland, but rather on the improvement of the whole glandular system; as one of the glands will always stimulate the others and so

set the whole vitalizing group of glands in motion.

There is no doubt that as far as Steinach's rats are concerned, their rejuvenation was genuine. This was proved by a controlling test based on a physico-chemical process invented by Ruzicka of Prague (Czecho-Slovakia). This process is based on the fact that youthful tissue is very plastic and elastic, because only to a small degree is it made up of rigid parts. Old tissue, on the other hand, is the more rigid the older it is, because the rigid parts approach each other during the process of aging. Because of this rigidity, the dispersion—that is, the distribution of the various parts from which the tissue is made—is reduced, together with the quantity of moisture contained in the tissue. By employing a microscope, this reduction of dispersion is plainly visible; it can also be observed by employing certain acids. The more slowly fragments of tissue are dissolved by these acids, the older they are. By a counter test, it is possible to verify the result of the first test.

Ruzicka applied his methods to young, old, and rejuvenated rats. As, in the course of time, Steinach had rejuvenated more than one hundred rats, he could dispense with a few of his specimens for Ruzicka's research work. The facts which the Prague scientists established proved that the rejuvenescence of Steinach's rats was genuine. Extracts made from the different organs of the rejuvenated rats and subjected to the Ruzicka test proved that their tissue was just as easily dispersed as the extract made from the tissue of young rats. By this test, it was proved beyond doubt, that rejuvenated tissue again takes on a condition of real youthfulness.

In due course of time, Steinach's experiments with rats were taken up by other scientists all over the world. Many of those scientists experimented with other animals than rats, but all came to the conclusion that Steinach's contentions were justified, though some of them do not agree with Steinach regarding the cause of the rejuvenation. Some hold that rejuvenescence will show only after the regeneration of the generative tissue has

commenced; others agree with Steinach in the opinion that the proliferation of the interstitial tissue is the cause of this improved condition.

It is here that the difference between the transplantation process and vasoligature shows most clearly. Transplanting will result in a definite replacement of the generative tissue by interstitial tissue, while vasoligature will bring about a regeneration of the generative tissue after only a temporary displacement of the latter by interstitial tissue—the so-called Leydig cells, by Steinach called “puberty gland.” But whatever the point of view may be of the one or the other, scientists who have investigated the causes of rejuvenation brought about by the Steinach Method are unanimous in the opinion that this method results in a very definite reënergizing of the body.

Among those who tested Steinach’s Method on other animals than rats are Kuntz, Sand, and Otmar Wilhelm, who experimented with dogs. One of the most striking cases is reported by Sand and deals with a hound which, totally decrepit at an age of twelve and one-

half years, was brought to the Veterinary Clinic in Copenhagen to be destroyed, as there seemed to be not the slightest chance of improving the condition of the extremely senile dog. When Professor Hansen examined the hound before the Steinach Operation was performed, he gave as his opinion that the condition of the animal was simply hopeless; but after the operation, when the hound was again examined by him, he did not hesitate to declare that the recuperation of the patient was marvellous and utterly unexpected.

Before the operation, the hound could hardly walk—sometimes not even stand on his legs. His skin was peeling off, uncovering extended ulcerations. He did not exhibit any symptoms of hunger, his digestion was very poor, and he had scarcely any teeth left. His senses were dulled to such an extent that he hardly took any interest in his surroundings.

In May, after he had undergone the Steinach Operation, he soon became voracious. He had not shown the slightest interest in other members of his species for a long time, but again took lively notice of the doings in

Dogdom. In August, three months after the performance of the Steinach Operation, he was judged to be ten years old. In the autumn, he gave the impression of a dog about seven. His skin was once more in a healthy condition and his coat of hair greatly improved. His muscles had regained their former strength and his endurance in general was so great that he was able to accompany his master on long bicycle trips. His senses were even keen enough to again put him to use as a hunting dog.



## XII

### REJUVENATION AND AGRICULTURE

THE successful rejuvenations which Otmar Wilhelm achieved on bulls, and Lengeman on stallions, not only proved the efficaciousness of the Steinach Method as such and prepared the way for employing this method on man, but also opened great possibilities for the breeder of cattle and horses.

Rejuvenating domestic animals ought to be judged from an economical point of view; if a prize bull or a blue ribbon stallion can be reconditioned and again put to use, quite a remarkable economical gain is to be recorded.

By the Steinach Operation, the usefulness of a stallion can be prolonged, provided vasoligature was performed on only one of the spermatic ducts. Of course, as soon as vasoligature is performed on both ducts, the sperm cells cannot be discharged any longer



and the very purpose of a stallion would be frustrated. But as long as only one of the ducts is ligated, the power of propagation is quite sufficient to produce healthy offspring as has been proved in numerous cases. Otmar Wilhelm reports that rejuvenated bulls again came into the full possession of their former propagating powers.

Within the whole realm of agriculture, great possibilities offer themselves for the rejuvenation of domestic animals. By applying vasoligature, the farmer will be able to prolong the time in which cows are able to calve, and consequently a greater and longer output of milk is assured. It will also be possible to prolong the efficiency of dray and saddle horses and other kinds of animals that are used for agricultural purposes. There is not the slightest reason why vasoligature—having been performed on horses, cows, and dogs—could not also be used to prolong the usefulness of sheep, goats, pigs, and even poultry. As animals that have been subjected to vasoligature develop a voracious appetite soon after the operation, it will be so much

easier to fatten them for the market. Not only will the animals be heavier, but their meat will be of an improved quality.

As a matter of fact, vasoligature, without being referred to as such, is used extensively by chicken farmers. Capons are the result of nothing else than a severing of the spermatic duct, while "poulardes," a specialty of French chicken farmers, are hens that have undergone the process of sterilization; to produce abnormal growth their tubes have been cut. Whereas the prevailing theory regarding capons—that they are nothing but emasculated roosters—is perfectly correct, the belief that "poulardes" are defeminized hens is wrong. They are simply hens that, through the performance of spaying, have been rejuvenated. For this reason, a "poularde" of more than the size of a normal hen is as tender as a chicken.

Another experience within the realm of agriculture is observed in those countries where mules are used extensively. Mules, cross-breeds of horse and donkey, are not only taller than the donkey, but also stronger.

They possess greater endurance and longevity than the parental animals. Most of these symptoms of an intensified vitality are peculiar to all cross-breeds of the animal kingdom. None of them, as a rule, are able to propagate with each other. It seems quite possible that the reason for this insufficiency of propagative powers has its origin in the fact that the sperm cells of those cross-breeds do not achieve proper maturity—that, at least, has been proved by Poll with cross-breeds of pheasants and ducks. If we take it for granted that this immaturity of sperm cells also prevails in the case of horse and donkey cross-breeds—mules, we may assume that the generative gland of these cross-breeds contains interstitial tissue to a much greater extent than generative tissue—in short, that the generative gland of a cross-breed most probably resembles the generative gland of a male subjected to vasoligature, and for this very reason intensifies vitality and general efficiency. This, of course, has to be paid for in turn with the destruction of the propagative powers.

## XIII

### WHEN TO BE REJUVENATED

AFTER having subjected vasoligature to extensive experiments on animals, it seemed quite permissible to apply this method to man, provided that necessary precautions were observed. Results that were brought about by vasoligature on man (specific cases to be treated in a special chapter) proved absolutely equal to those achieved on animals. However, before going into the details of the effects of rejuvenation, it seems logical to answer three questions:

When ought one to be rejuvenated?

Which cases promise satisfactory results?

In what cases should vasoligature not be recommended?

Roux claims that the most favorable time for rejuvenation is the time when a diminishing of vitality manifests itself in men and



(a) FIFTY-SIX YEAR OLD CONTROLLER BEFORE THE STEINACH OPERATION  
(b) FOUR MONTHS AFTER THE STEINACH OPERATION  
(Ufa Steinach-Film)



women; when strength wanes and a general feeling of listlessness prevails although the individual is not exactly decrepit nor does he show serious symptoms of old age. There is another reason why this time would be the most favorable for the Steinach Operation; namely, because around this time of life the generative gland, already showing—it may be, negligible—symptoms of diminishing vigor, enters a stage in which it tries to rally itself. This is when a slight beginning of proliferation of the interstitial tissue may be observed, but this impetus is too negligible to produce real revitalizing results. If the Steinach Operation is performed when the individual is in this stage, the success of vasoligature will be so much more marked because the proliferation of the interstitial tissue, stimulated by vasoligature, is supported by the body's own tendency to bring about regeneration by itself.

As far as the most favorable age is concerned, there is no possibility of setting a definite limit. "A man is as old as his endocrines," as Gertrude Atherton says in her novel "Black Oxen," and as the time for a



gland to develop tendencies of atrophy depends on the individual, the most favorable time for the performance of the Steinach Operation has to be decided on the merits of each case. Of course, the older the individual is and the more extended the degeneration of his glands, the more limited the chances for success. But even in cases where glandular atrophy has progressed rather far, surprising results have been observed.

The most complete and enduring results have been achieved in cases of premature senility. Peter Schmidt, of Berlin, ventures the opinion that cases of normal senility should not be treated at all, even though he agrees that there may be cases that should participate in the benefits of a rejuvenation operation. Those exceptions seem especially permissible today when the struggle of life is so intense, because the treatment makes it possible to conserve the earning capacity of the individual. This argument seems all the more acceptable since, according to Notnagel, there is only one individual out of every ten thousand who does not age prematurely.



Aside from all this, that stage of life in which no organic troubles manifest themselves, apart from common symptoms of advancing age, is the most propitious for submitting to vasoligature.

Considering the more frequent, though abnormal, premature aging it will be important to try to enumerate those symptoms of advancing age which warn against an operation, and those which point to the favorable opportunity for rejuvenation treatment. It is the function of the consulting physicians to diagnose each case and decide what to do. It would be absolutely impossible to enumerate all the different symptoms for and against an operation, in the limited space and scope of a popular treatise on rejuvenation, especially since it is a question among the physicians themselves which has not yet been thrashed out to general satisfaction. Payr, for example, enumerates a long list of symptoms which make for restrictions regarding the advisability of the Steinach Operation; and Lichtenstern insists that, in general, a very strict limitation of the cases ought to be observed. Contrary to these

views, Peter Schmidt believes in extending these limits as much as possible and even admits that, in a number of cases, the earnest desire of the patient to subject himself to the Steinach Method caused him to perform the operation, even though he did not consider the case a hopeful one.

Aside from premature old age and insufficiency of procreative powers, as mentioned before, the deficiency of one or the other of the ductless glands, according to Peter Schmidt, is cause enough for applying the Steinach Method. Other cases, which would lend themselves admirably to the treatment, are hardening of blood vessels, cancer, and certain psychoses and neurotic ailments. Schmidt makes it a point to warn against the performance of an operation in cases of neurasthenic and hysteric complaints; in cases of advanced senile weakness; and in cases of atrophic generative glands. If the patient registers an abnormally high blood pressure, there lurks the danger of apoplexy in case his hardened, calcium burdened blood vessels cannot withstand the pressure; the operation may

not succeed in checking the too far advanced sclerotic condition and ward off the lurking danger. Other cases that do not lend themselves to the application of the Steinach Method are progressed degeneration of the heart muscle and diseases of its coronary blood vessels, whereas cases of well compensated valve trouble have not been aggravated by the operation.

These opinions are supported by the abundant experiences which Dr. Harry Benjamin, of New York, has reported. He abstains from operating in those cases where "natural remedies"—that is, rest, care, and proper nourishment would suffice to improve the condition of the patient. According to his experiences, certain cases of affection of the spinal cord do not lend themselves to treatment of the Steinach Operation.

## XIV

### SUCCESSFUL REJUVENATIONS OF MEN

OBSERVING those cases which the physician has deemed advisable to treat with the Steinach Method, we notice in man, just as we noticed in animals before, that the first result manifests itself in a growing appetite, on account of which the patient quickly gains in weight. This fact alone stimulates recuperation of the patient and it is extremely remarkable to notice that the patient does not crave very rich and appetizing dishes. As a matter of fact, among the first patients successfully rejuvenated in Vienna, were quite a number of unskilled laborers who could not afford expensive food, especially meat. But, on account of a general improvement of their metabolism, even scanty rations of cheap food were assimilated so thoroughly that even a part of the ration which before had not sufficed to retard a progressive diminution in

weight, now proved more than sufficient to bring about a gain of weight.

There is no doubt that the improved metabolism is partly brought about, and certainly supported by, an improved respiration. Loewy and Zondek, performing the Steinach Operation on men from fifty-seven to sixty-six years of age, came to the conclusion that most of the rejuvenates improved their breathing capacity; that they were, therefore, able to absorb more oxygen and could exhale more carbon-dioxide. Metabolism and respiration obviously stimulate each other.

On account of the improved respiration, the number of the red corpuscles of the blood increases, and so does the quantity of hæmoglobin, the element that gives the color to the blood. The quality of the blood as a whole is greatly improved; high blood pressure, one of the most frequent symptoms of old age, is reduced. The blood stream moves more smoothly now, alleviating sclerotic complaints, brought about by a hardening of connective tissue and of calcium imbedded in the walls of the blood vessels. On account of the greater

amount of oxygen furnished to the red blood corpuscles, and the improved functioning of the glandular system, the whole body is more quickly and thoroughly freed from poisons than before. This results in a generally improved "turn-over" of all the assets of the body, which became apparent in the beginning as the result of improved capacity for assimilating food.

The restoration of working capacity is especially marked in the muscular system of the whole body. While before the operation, physical exertions quickly brought about a condition of exhaustion, afterward there developed a decided feeling of strength and endurance. In one of the very first cases treated by Steinach and Lichtenstern, vasoligature was performed on a prematurely aged laborer who, on account of general weakness of his muscles, was unable to earn his living. Four months after the operation, his strength had returned to such a degree that it was not much of an exertion for him to lift and carry loads up to two hundred and twenty pounds in weight.

It is easy enough to test the muscle strength of a patient with the dynamometer, so that there can be no self-deception. This instrument is spring-like, oblong, and small enough to fit the palm of a man's hand. By pressing the instrument, a little pointer registers on a scale the number of pounds pressure made by the muscles of the hand and arm.

Another decided symptom of returning strength shows itself in a general improvement of the nervous system. This may not be observed in physiological manifestations only, but in psychic as well. This seems only logical, because an intensified capacity for work must necessarily be stimulated by intensified interest in one's work. It is just this intensified eagerness and capacity to work which Benjamin pronounces to be the most valuable characteristic of all the improvements brought about by the application of the Steinach Method. New strength now pulsates through the veins and a rejuvenated nervous system applies this regained youth advantageously. Endurance not only shows in the ability to perform manual labor, but mental work as



well. The manager of a great industrial establishment, when seventy-two years of age, was in such poor shape, that he could not attend to his strenuous and diversified duties any longer. He was treated by Lichtenstern and shortly after the operation said: "I am again able to think clearly as in years before and to sit down and write long and logical letters."

Conditions which are generally looked upon as manifestations of "mental senility" are remedied to a great extent. The memory is improved and the faculty to retain figures, names, and faces is restored. As our five senses are closely connected with the nervous system, and as these senses deteriorate in progressing senility, they are restored to their former keenness. With the rejuvenation of the body, cases are reported quite often, in which deafness was alleviated. There are quite a number of cases known, where the eyesight was greatly improved, and there are even cases on record in which cataract disappeared by itself.

Where rejuvenation shows itself most





(a) SEVENTY YEAR OLD PATIENT BEFORE THE STEINACH OPERATION  
(b) TWO MONTHS AFTER THE STEINACH OPERATION  
(Ufa Steinhach-Film)



clearly is on the skin. The epidermis of an aged individual, usually dry, withered, scaling off, bleached-like or bluish-red to a more or less extended degree, is replaced by fresh, rosy skin while wrinkles disappear. If new hair grows, it re-appears in its original color. The improvement first becomes apparent in the eradication of wrinkles, because those fat deposits under the skin of the face, which were diminished with advancing age, are accumulated again due to the increased nutrition and improved metabolism of the individual.

The length of time which is required until the growth of hair shows improvement varies greatly, and depends on the age and the general physical condition of the patient. This improvement in the condition of the hair does not come about in the manner which is usually effected in beauty parlors, which consists mostly of dyeing the hair and treating the scalp with stimulating lotions, but rather in such a way that white hair which is falling out is replaced by a new growth in the original color. Bald-headed men with very little

hair observed that the scalp again was covered with a downy growth, which steadily became longer and thicker. On spots which were still covered with a growth of hair, it grew more quickly and in greater abundance. As a matter of fact, many of these rejuvenates have to visit a barber shop more often than before. Sometimes this new growth of hair does not become apparent so soon. There are cases known where the new growth of hair was not noticed any earlier than in the second year after the operation, which, by the way, proves that it sometimes takes quite long for the symptoms of rejuvenescence to appear.

Usually the new growth shows itself first on the body proper and in most of these cases the new hair is even darker than it was originally. It seems that the new growth of hair, stimulated by vasoligature, contains more pigment and for this reason is darker. A very striking example of this is "Case 6" as reported by Schmidt who says: "Most surprising in this case was the change which the hair of the patient had undergone. What used to be completely white hair is now, and

to a great extent, intermingled with black hair, particularly on the back of the head and on the temples. The patient states that this development is the more surprising to him as he had never before been black but just auburn. The new growth of hair, as a whole, is blueish-black."

Like the hair, the nails of fingers and toes, being intrinsically of the same substance as the hair, are stimulated into new growth. If the nails, before the operation were slow growing, cracked and brittle, they grow much faster now, and they again become smooth and elastic.

Many of the improvements brought about by the Steinach Operation are due to the fact that insufficiencies of the one gland or the other are balanced as rejuvenescence returns. Most of the disturbances within the body are brought about by a disordered equilibrium of the glandular system. A special study of these disturbances has been made by Benjamin, who applies his own terminology to the constitution of the patient according to the functions of his glands. Patients whose physiological

and psychological make-up is mostly determined by the pituitary gland, Benjamin calls "pituitary cases." "Mixed cases" that is cases where two of the glands play prominent parts, he terms "thyroid-pituitary" cases or "pituitary-adrenal" cases, as the case might be. This terminology of Benjamin's makes it possible to classify the patients in a very satisfactory manner and give a "lead" regarding the general condition of the body and the glands which, stimulated, most probably would bring about a speedy recovery, in cases of failing health. It is one of the foremost symptoms of rejuvenescence, brought about by vasoligature, that cases where poor team-work of the glands disturbs the general health of the patient, this team-work is improved; a glandular equilibrium, so to speak, is brought about by the Steinach Operation, and with this a general improvement of the patient's condition.

A similar balancing can be noticed regarding those glands which possess a visible duct to discharge secretions. After the Steinach Operation, it will be observed that the functions of the kidneys and the prostate are better

regulated, and that urinary complaints are alleviated or even cured altogether, improvements which were observed in quite a number of cases (especially in Benjamin's Case No. 22).

If we recall that it is the improved condition of the generative gland which primarily brought about all the described symptoms of rejuvenescence, it is hardly to be wondered that, simultaneously with the improvement of the condition of the patient, a new vigor makes itself felt. This new strength manifests itself in a re-awakening of the most tender feelings in man which, with the growing re-strengthening of the patient, are almost invariably intensified to an actual possibility to live up to the gratification of his desires. This symptom, however, as made clear, especially by Benjamin, is not at all the most important benefit derived from vasoligature. This symptom of returned manhood will hardly ever be beyond bounds and, in some cases, may even be scarcely discernible. But whether it be noticeable to a greater or smaller extent or not, a general improvement of the

physiological and psychological condition of the patient is almost invariably noticed. The joy to live and to work returns, the whole aspect of life seems greatly changed towards a more optimistic view.



## XV

### IMPROVEMENT OF COMPLAINTS OF OLD AGE

IN enumerating the beneficial results of the Steinach Operation, it should not be overlooked that quite a number of symptoms of diseases are favorably influenced by vasoligature, and very often even cured. As age itself is a disease, it is sometimes very difficult to distinguish between normal and abnormal symptoms of old age. For this reason, it is necessary to judge not too hastily when such observations are made as the alleviating of cataracts, as mentioned before, and improvement of urinary troubles.

It is only logical that those diseases known as complaints of old age are amenable to the remedial influence of the Steinach Operation. These are diseases which attack the aging system much more frequently (perhaps exclusively) than a youthful body, without being

a necessary and exclusive symptom of old age. Every age has its own diseases, but as there are certain diseases that attack children especially (but not necessarily must attack them) so there are diseases incident to old age, but not obligatory to it, so to speak, and many an aged or aging individual is saved from these sad experiences. If an aged body is restored to youthfulness, complaints incident to old age cannot harm it any more. Had they already attacked the body, in many rejuvenescent cases, they are shaken off without the necessity of any specific treatment of the disease. The science of medicine up to now refused to recognize a universal remedy for each and every complaint and condemned assumptions of this kind as fakes. An operation, however, which reduces the appearance of the patient to an age lower in number than his years actually count, will endow the patient with prophylactic properties to fight those diseases which are incident to his real age. In this respect, rejuvenation may be called a universal remedy.

Certain disturbances of blood circulation

and of the nervous system are almost invariably incident to aging—such as a twitching of the skin, prickly sensations, convulsions, shortness of breath, heart complaints, local anæmia on account of a narrowing of the blood vessels, and arteriosclerosis.

The records of physicians, who collected material on the rejuvenating results of the Steinach Method, are full of cases in which complaints, as enumerated before, were alleviated, cured, or at least effectively checked from growing any worse.

Other symptoms incident to old age, as frequent as they are unwelcome, are different kinds of tumors. For example, sebaceous tumors of a seventeen-year-old hound disappeared after vasoligature had been performed by Harms. Similar experiences have been recorded after the treatment of man with vasoligature. One of the most interesting experiences is the disappearance of complaints incident to a swelling of the prostate. This diseased condition of a very painful nature generally necessitates the performance of a rather serious operation. Patients suffering

from this disease, who had the Steinach Operation, did not have to undergo a special surgical treatment to remedy their prostate trouble. The improvement was simply incident to the performance of vasoligature.

Pernicious ulcerations, which are the bane of advancing age, and which usually are referred to as cancer, seemed greatly relieved in patients who had undergone the Steinach Operation. The condition of these tumors, the origin of which is still unexplained, was greatly improved in a number of cases that were treated by Finsterer (Vienna) who reports that in quite a number of cases he resorted to vasoligature when the condition of the patient was such that a cancer operation did not seem feasible. In other cases which seemed hopeless on account of the general condition of the patient, the latter was given back to life and work without performing a cancer operation, which in the majority of cases, the patient would not have had strength enough to survive.

It is not the intention of the writer to raise hopes that cannot be fulfilled, being not at all

of the opinion that cases of cancer can definitely be cured by rejuvenation. The real cancer is a disease incident to old age. That means that this disease mostly attacks those people who have already lived the greater half of their lives. If people like these are restored to a bodily state corresponding with a younger age than their actual years, cancer could not attack them as viciously as if they were in a senile condition. The conclusion seems warranted that the cancerous disease, as such, is not altogether combated by rejuvenation, but is rather postponed, and that the system's resistance will last as long as the effects of rejuvenation last. As soon as the effect of rejuvenation wears off, new cancerous conditions, either on the old spots or else in new places, may develop. The experiments which Harms performed on a dog seemed to prove this theory, even though the dog's disease was not a cancer, but a sebaceous tumor. These tumors reappeared as often as the effects of rejuvenation wore off, and Harms had to subject the dog to rejuvenation treatments by transplantation several times. Although re-

juvenation is no definite cure for cancer, there is reason enough to be satisfied with the results achieved so far. Those results are not to be under-estimated, when people who are condemned to death are given back to life and work, even for a few years.

It is quite possible that, in connection with the improvement of cancerous conditions through rejuvenation, the opinion may be advanced that it is not the rejuvenation treatment itself which affects the cancerous condition of the patient favorably, but rather the improved, general state of the patient's health. Finsterer reports that in a number of cancer cases the average weight gained by the patients was twenty-two pounds. Of course, if the general condition of a patient is improved to such an extent that he gains in weight, the system is much more able to resist and fight malignant ulcerations.

There is another disease which, like cancer, takes an enormous toll of humanity, and that is tuberculosis. This disease is not incidental to any certain age and, like cancer, no definitely positive remedy has been discovered. In



tuberculosis, as we know, the better the general condition of the patient, the quicker he reacts to treatment. In fact, tuberculosis hardly ever takes root in a well-nourished system. As a satisfactory general condition plays such an essential part in the cure of tuberculosis, improvements as usually brought about by the Steinach Method should help greatly to fight this dreaded disease.

This conclusion has been proved correct, at least as far as animals are concerned. Old rats very often suffer from tubercular ulcerations. Among those that were treated according to the Steinach Method, quite a number were suffering from tubercular ulcerations to such an extent that both lungs were almost completely destroyed. Simultaneously with an appearance of general symptoms of rejuvenation, the progress of tubercular ulceration was checked and an effective regeneration of the tissue of the lungs stimulated.

In spite of these observations by Steinach and Ruzicka, Mautner advanced the opinion that tubercular conditions in animals were aggravated through a rejuvenation treatment.

But it seems much more logical that tubercular conditions should be alleviated because, as Loewy and Zondek found out, improved respiration is the usual effect of rejuvenation. In the light of this, Mautner's findings might be nothing more than mere accidents. Just the same, it seems worth while to study closely the relation between tuberculosis and rejuvenation for there seems a probability that such a study will eventually rank tuberculosis with those diseases that can be greatly improved by careful application of rejuvenating treatments. The only exception would be hasty consumption, so-called, because this disease, like every extremely serious disease, taxes the resistance of the body to the utmost, accelerating the general debacle. We will, however, discuss this more later on.



## XVI

### REJUVENATION IN WOMEN

UNTIL now, we have dealt mostly with rejuvenation as far as man is concerned. The question now arises: What are the chances for rejuvenation for woman? There cannot be the slightest doubt about the fact that the rejuvenation problem meets much greater obstacles in its application for the benefit of the fairer sex. Every attempt to bring about rejuvenation in woman by a surgical operation is much more difficult and more dangerous than in man, because the woman's anatomy is so much more intricate.

On men, it was easy enough to bring the internal secretion of the generative gland back to its old standard. The excretory canal of the generative gland was simply ligated (by vasoligature) and definitely severed (by vasectomy). In this way the external secretion was

stayed and, consequently, pressure was exerted upon the gland itself which in turn resulted in stimulating the interstitial tissue (as has been explained in an earlier chapter).

But an operation on women, analogous to vasoligature on men, would never bring about the same stimulating effects because a resection of the excretory duct (tube) of the female generative gland (ovary) would never produce any pressure on the gland itself, as there is no close connection between the tube and the ovary. The whole structure of the female generative organs is such that they cannot be approached with the method that can be applied to the male.

This was proven through experiments on female rats, but still the question is not yet definitely settled, as is evidenced by the experiments made on "poulards" (which are hens with resected tubes) and on patients of Liepmann (Berlin) whose health was marvelously restored after the removal of the womb—an operation which necessitates an incidental cutting of the tubes. The restorative effect in these cases was so strongly marked

that Liepmann did not refrain from calling its result, "rejuvenation." Liepmann's cases, however, were patients suffering from tumors of the womb (myome) which necessitated a removal of the womb to forestall the danger of fatal hemorrhages. Soon enough, physicians raised the objection that the rejuvenation of those women was not real rejuvenation, but rather the consequence of a cessation of the weakening loss of blood, which those women had suffered until the tumors were removed. It is, of course, hard to disprove this objection. But even if this objection could be disproved, even if ligating and cutting of the tubes would have similar effects as the corresponding operation in men, we could not very well do it unless some disease should necessitate such an operation. For the purpose of rejuvenation alone a major operation like that should never be performed.

On the other hand, it is quite certain that a changed composition of the female generative gland will exercise secretoric effects similar to those experienced through a corresponding change in the structure of the male genera-

tive gland. We know that the generative gland of a woman undergoes such a change, as a natural process during the period of pregnancy; for throughout those months the ripening of eggs and menstruation are interrupted. The small cavities in the ovary containing the eggs (Graafian vesicles) do not reach their full size, but close up and are filled with a tissue that gradually extends through the whole generative gland which then possesses the characteristics of a gland with internal secretion. Here the same process occurs quite naturally which, in an artificial way, is brought about by the ligation of the duct of the male generative gland. To state it more clearly, the generative tissue is temporarily destroyed and replaced with a gland-like interstitial tissue.

It seems logical that similar changes in the structure of a gland should produce similar clinical consequences. This is proved by the fact that healthy pregnant women, unless they suffer privations through poverty, hunger or hard work, very frequently look "the very picture of health," a blooming out that im-

presses us almost as rejuvenation. As a rule, those women who lack in appetite eat much more during this time; their former chlorosis and anæmia disappear; their cheeks redden, and are well rounded. Never before has their general health been better. Their interest in life is heightened; ambitious plans are made for the future. Perhaps the hoped-for happiness of motherhood is greatly responsible for these beneficial effects, but still the impression remains that inner secretoric changes are the stimulating factors—these changes resulting from a generative gland that has been transformed almost entirely into a gland with inner secretion.

This assumption seems so much more justified if we look back upon the experiments with animals. As already discussed before, old female rats were rejuvenated by the implantation of youthful, generative glands. These rats improved to such an extent that they even regained their fertility. In the course of these experiments on rats, the fact was established that the glands which were most efficient for implantation purposes were

those taken from pregnant animals. In the light of what has been explained before, the decided rejuvenating effect of these glands from pregnant animals seems only logical, because these transplanted glands were almost entirely glands with inner secretions.

How, then, would it be possible to change the structure of the female generative gland, as it is changed by nature during the time of pregnancy? How could the female generative gland be regenerated after the female organism is incapacitated for pregnancy; at this critical time when there is no possibility of restoration of those functions, but, on the contrary, when such symptoms are noticed as a general depression and a general diminishing of physical and mental efficiency?

If an operation performed on the excretory canal of the female generative gland will not produce rejuvenating effects (for reasons already explained), the only contingency left would be to bring about rejuvenation either by implanting foreign, youthful glands, or transplanting the patient's own gland within the body. But, as pointed out before, the pro-



curing of suitable implantation material would be very difficult, and the transplantation of the patient's own gland within the patient's own body would be too dangerous an operation to warrant its performance, especially since animal experiments have proved that the transplantation of the female generative gland will not produce results of a decided rejuvenating character.

After the fact is established that two entirely different methods: (1) the implantation or transplantation of generative glands, and (2) the ligation of the excretory canal of the generative gland, bring about the same effect, *i.e.*, a proliferation of the interstitial tissue by which the latter replaces the generative tissue, two conclusions seem fully warranted: first, that the generative tissue is much more sensitive than the interstitial tissue and, second, that if only negligible harm is done to the generative gland as a whole, this interference with the structure of the gland will bring about a proliferation of the more hardy interstitial tissue at the expense of the more sensitive generative tissue.

The question now arises: Is there a possibility of bringing about this negligible, and at the same time stimulating, interference with the structure of the female generative gland, without resorting to a dangerous operation, and without jeopardizing any other organ of the body?

Drugs could hardly be used for this purpose, even though it is very well known that certain chemicals, such as alcohol and iodine, have a poisonous effect on the generative tissue, at the same time logically stimulating a proliferation of the interstitial tissue. However, drugs like these could not be resorted to because the effect of these chemicals cannot be localized on the female generative gland and the entire body would be endangered by their effects. If this were not the case alcohol, for example, would be an admirable means of rejuvenation. But we know for a fact that the drunkard is not exactly benefited by the proliferation of the interstitial tissue of his generative gland; he usually suffers from a fatty heart, contracted kidneys, and other dangerous changes of vital organs. Similar re-



sults would be produced by the application of other poisons.

In the course of numerous animal experiments by Steinach and Holzknacht, a method was developed which is not based on chemical reaction, but rather on physical effects. This method permits a strict localization of the agent that influences the generative gland and produces the same results that an implantation, transplantation, or a ligation of the spermatic duct would produce. This method consists in a careful application of the Roentgen rays, commonly called X-rays. While these X-rays are applied, the entire body, with the exception of the zone where the X-rays are supposed to take effect, is covered in such a way as to exclude their influence on the other parts of the body. Only the generative gland and its immediate neighborhood are exposed to the Roentgen rays.

Experiments by Steinach and Holzknacht along these lines, performed on immature guinea pigs, only four weeks old, produced marvelous results. Under the influence of the X-rays, these immature guinea pigs

achieved a hundred per cent maturity in a very short time, their bodies being as fully developed as those of pregnant animals or animals that had already given birth to young ones. The X-rayed guinea pigs, without having given birth to young ones themselves were now in a condition to suckle the young ones of mother guinea pigs.

The same method which will prematurely mature immature guinea pigs, if applied to regularly matured guinea pigs, will bring about rejuvenating effects by redeveloping the already aged animal into an animal in its prime. The explanation for this truly remarkable effect is to be found in the fact that the generative gland, by being exposed to the influences of the X-rays—if immature—is advanced into a state of premature maturity, and if aged is brought back into a state of maturity. In both cases, the result is brought about by an intensification of the inner secretion of the generative gland.

As soon as experimentation on animals had revealed the feasibility of the application of X-rays for rejuvenation purposes, there was

no need for hesitation in trying the method on women. One of the pioneers in this respect was Holzkecht, who cured with X-rays women suffering from complaints incident to change of life and hemorrhages of the womb. These treatments incidentally resulted in remarkable rejuvenations. Women between the ages of forty-five and fifty-five, after having been treated with carefully measured X-rays, which were limited to the immediate neighborhood of the generative glands, were again imbued with a new interest in life, and regained their physical and mental efficiency completely, although they had formerly been worn out and generally disinterested in life. Hand and hand with these more psychic effects of rejuvenation, a change in their general appearance became noticeable. These women were very often complimented by acquaintances upon their youthful appearance. Wrinkles disappeared from their faces, and the face again became more rounded out and the skin more elastic. In general, these women showed the same signs of rejuvenescence as men after the performance of vasoligature.

Even though it seems that the problem of rejuvenating women was solved by the discovery of the rejuvenating powers of the X-rays, there is still one remaining difficulty: the correct dosage of the X-rays. It is impossible to compile a chart to guide the consulting physician and the X-ray expert, as the dosage of X-rays depends upon the individual's condition, and has to be ascertained with the greatest of care.

What is needed to bring about rejuvenating effects by X-rays is a so-called stimulating exposure, which will result in a proliferation of the interstitial tissue of the female generative gland. This stimulating exposure should result in nothing more than a withering of the ovarian vesicles containing the eggs (Graafian follicles) but should not endanger the interstitial tissue. If the exposure is too weak to stimulate the proliferation of the interstitial tissue, no result whatsoever is achieved; the exposure would simply be ineffective and nothing would be changed. If the exposure is too strong, not only would

there be a withering of the generative tissue, but this withering would extend to the interstitial tissue and possibly destroy the whole organ, therefore bringing about the extreme contrast of what was intended. Instead of a rejuvenating result, an acceleration of the process of aging would ensue. To avoid the dangers which lie hidden in the applications of the X-rays, very weak exposures are usually employed at first. These exposures are gradually intensified until the desired result manifests itself.

Of course, the X-ray method as a whole is open to extensive improvements, but it may be said here that experiments are under way which will result in a thorough perfection of the rejuvenation treatment for women. As these experiments have not yet progressed far enough, they are not at a stage in which the laity can be made acquainted with them. But there seems to be a justified hope that, within a comparatively short time, the new method will be developed to such a degree that the difficulties of the X-ray treatments will be

entirely obliterated, and results will be achieved as in the cases of men on whom vasoligature has been performed.

Clinical experiences with his first six women patients showing more or less marked results were reported (1923) by Dr. Harry Benjamin, New York. The history of two of these cases is related in the clinical supplement.

Incidentally, it may be stated that the X-ray method can also be successfully employed for rejuvenation purposes in men. But as the cutting of the spermatic duct is a procedure much more easily employed than exposure by X-rays, the latter is hardly ever resorted to. Persons working in an X-ray laboratory for years (physicians and nurses for example) have noticed that their inner secretion is stimulated and effects are brought about which, in general, resemble the effects of a rejuvenation treatment by X-ray.

## XVII

### IS REJUVENATION UNNATURAL?

THERE never has been a discovery of any merit that was not attacked in the beginning, and attacked mostly by people who logically should have promoted its development. Generally, the first attack comes from the very ranks of the man who has achieved something worth while. History gives us so many examples of this, that we should not be the least bit surprised that Steinach was, and still is, the aim of many attacks by people who frankly declare that they do not believe in rejuvenation as a whole, and especially not in Steinach's Method. When the first news about Steinach, and what he stands for, spread through Europe shortly after the conclusion of the Great War, the Viennese savant was sneered at, laughed at, and even savagely attacked by colleagues as well as by the laity,



the latter led on by clergymen of almost all denominations, who declared that rejuvenation was nothing less than interference with the Lord's own will.

Slowly the attacks subsided and, while Europe to all appearances forgot about Steinach, many operations were successfully performed, especially in Vienna and Berlin. Again the limelight was thrown on Steinach and his method, as the latter was introduced in America by Dr. Harry Benjamin of New York. Once more the same kind of opposition and support could be heard.

Now what *are these pros and cons?* Indeed, it is worth while to go into details here, since by taking up the objections of the opponents of the Steinach Method, the arguments for and against this treatment can be so much more closely studied.

One of the arguments most frequently advanced is the contention that rejuvenation is unnatural; that nature should not be tampered with; that nature, in the long run, would not submit to being tampered with; and that nature would avenge itself sooner or later.



If there is any truth in this argument, then humanity would once and for all have to renounce the use of such everyday necessities as toothpaste and mouthwash solutions, and surely we would have to refrain from having our teeth filled. We would have to take down the lightning rods from the roofs, because these things are intended to deflect the detrimental manifestations of nature, and for this very reason would necessarily have to be regarded as that which is against nature—something unnatural. But let us go deeper into the “unnaturalness” of rejuvenation. It was Kyrle who proved that, during the years of mature life, enormous quantities of generative tissue are destroyed and replaced by interstitial tissue, the latter eventually bringing about a regeneration of the former. This sway of destruction and construction amounts to nothing less than a continuous and natural rejuvenation process which, in conjunction with the other ductless glands, is carried on with the effect of conserving the procreative powers at par. This natural replenishment of the generative gland keeps on, while, about the time

that senility begins in the man and change of life in the woman, a more and more noticeable reduction of the procreative powers and a general diminishing of mental and physical strength set in.

If a rejuvenating operation is performed at this stage of life, the process of temporarily replacing generative tissue by interstitial tissue is brought about artificially instead of starting in automatically, and not only within the region of the generative gland, but in all parts of the body. The sway of destruction and construction, as described before, once more receives a new impulse.

There are numerous examples of aging bodies that rejuvenated themselves out of their own strength, in accordance with the process of natural rejuvenation. In these cases, old people were surprised with new teeth or a new growth of dark hair, and they again felt the urge to marry. On the other hand, quite a number of cases may be observed every day when natural rejuvenation stops in comparatively early years.

As the Steinach Method does not do any-

thing else but stimulate a natural process of rejuvenation, this means of bringing about a reënergizing of the body cannot very well be termed "unnatural."

## XVIII

### REJUVENATION WITHOUT STEINACH

AFTER establishing the fact that there is such a thing as a natural rejuvenation, the question now arises whether the possibilities and the time limit of this natural rejuvenation could not be extended by exercise and a healthful mode of living. Would it not be possible to establish this natural rejuvenation as a rule?

The achievement of this goal would not be impossible. In the first chapter, it has already been stated that a perfection of metabolism, to such an extent as to keep vital organs free as much as possible from poisonous by-products of the process of assimilating food, is the most important problem in connection with the preservation of health. It is not so important how this result is achieved. If respiration is improved, if the circulation of blood is not impeded by arteriosclerosis

beginning, all the tissues of the body will be purified so much more thoroughly and with much more expediency. Athletic exercises of any kind, be it calisthenics, swimming, golfing or what not, will help to gain this end. Even mental exercise, if not practiced too one-sidedly will help. This seems to be proven by the fact that scientists, even at a stage of advanced age when other old people are already feeling the vicissitudes of old age, are still able to do mental work in spite of a decided slump in their physical strength. It appears that the cerebral cortex of these men of science is used to strenuous mental work, or to make it plainer, is used to a very thorough metabolism.

The rejuvenating effect of a thorough and uninterrupted metabolism is plainly evident in the experimental results carried on in an effort to prolong the life of single leaves of such plants as Begonias, Geraniums, Camillias, Ivy, and Potatoes. How frail these leaves usually are! How easily they dry up and wither! But if we separate sappy leaves from the mother plant and transplant them into

moist dirt, they will take root and grow. The leaf-stalk will develop into a stem, drawing nourishment from the earth; and while the leaf proper absorbs the richly flowing sap, the cellular texture of the blade is still fresh and clean at a time when the other leaves, still part of the mother plant, have long since dried up and withered.

In connection with this, even though it may seem far-fetched, our attention is directed to the strength-preserving effect of living a virtuous life. Not only does it seem far-fetched to mention sexual abstinence here, but it also seems contradictory, because any organ that is not put to the use for which it is intended will atrophy just as a muscle will soften from disuse. But as far as the generative gland is concerned, sexual abstinence will result in a withering of the generative tissue only. As has been explained before, the withering of the generative tissue results in its temporary replacement by the interstitial tissue, the immediate effect of which is an intensification of the inner secretion of the entire ductless gland system. This intensified inner secretion not

only helps to rid the body of poisonous by-products of metabolism, but at the same time puts the generative tissue itself into a state of preparedness, so that, in a case of necessity, the latter will regenerate very promptly.

It has been pointed out before how strongly marked the effects of the X-rays are. The same effect, only in a lesser degree, is brought about by the ultra-violet rays of the sun. A rational application of this principle, with the distinct intention to keep the generative organs youthful, was already known in old India. Anybody who ever took a sun-bath has surely experienced a distinct invigorating effect. A "sun cure" under medical supervision is certain to work wonders. If the patient, however, is unable to avail himself of the benefits of a genuine sun cure, treatments with artificial sun light (Quarz Light, Alpine Sun Lamp) will prove effective and will reawaken the joy of life and the urge to live and love.

Another of what one may term natural methods of rejuvenation consists in the internal and external application of mineralized waters. It is not only the exercise of diving



and swimming that proves invigorating, but a general stimulation is also brought about by the minerals and salts contained in the water. Steinach directs the attention especially to such springs whose water contains radium, like the springs of Gastein and Joachimstal, and ventures the opinion that these springs slightly stimulate the generative gland. The same effect is induced by artificially medicated baths (iron or salt) and salt water bathing.

Returning to the question raised at the beginning of this chapter: whether the possibilities and the time limit of natural remedies for rejuvenation could not be extended and so make the Steinach Operation superfluous, we feel that we should answer this question with: No. But even if the Steinach Operation should gain tremendous popularity, hardly a majority of those people in need of it would avail themselves of the treatment. The Steinach Operation should be resorted to in those cases where aging cannot be combated any more by proper living alone.

## XIX

### REJUVENATION OR RECUPERATION?

THE first patients who were treated according to the Steinach Method had not come to consult a physician on account of complaints incident to old age. These patients were absolutely unaware of the fact that medicine is now on the way towards successfully combating the effects of age. The complaints that brought the patients to a physician consisted of tumors, abscesses, and inflammations of organs in the proximity of the spermatic duct. As long as the latter complaint made a surgical treatment necessary, the opportunity offered itself to perform vasoligature at the same time, and watch the result. If the success was as expected, it was generally said that the man had recovered; not a word was said about the man being rejuvenated. If by vasoligature excruciating pains were alleviated, hem-

orrhages checked, and urinary complaints eliminated, the almost miraculous restoration of physical strength was taken for merely a natural result—nobody ever thought of calling these effects “rejuvenation.”

Regarding the rejuvenation of women who had undergone womb operations for the removal of tumors, as mentioned in an earlier chapter, it has to be admitted that in such cases there is a strong possibility that the rejuvenating result brought about was incidental to a general recuperation and should not be claimed as a proven and genuine rejuvenation. The same contention, but not as logically sustained as the former, is often made in connection with the surgical alleviation of prostate complaints by the removal of the prostate (prostatectomy), an operation which can hardly ever be performed without a severing of the spermatic ducts. The restoration of physical health that usually, though not always, follows in the wake of this operation, is so distinct that we cannot very well speak of plain recuperation any longer, but must often regard this recuperation as rejuvenation.

An example of the rejuvenating effects of prostatectomy is Georges Clemenceau. Since he underwent this operation eighteen years ago, he enjoys a regained youthfulness which is clearly evident in his intense mental activity, and his physical strength. His eyes are clear and bright and his skin glows with health. Under the direction of his physical instructor, Philippe Roy, he spends a vigorous half-hour exercising each morning, never pausing for a moment's rest. After a cold shower, he takes a walk of never less than four miles. The powerful way the "tiger" shakes hands is most surprising, as Clemenceau is of very slight build and gives the impression of a man endowed with merely average physical strength. Recently, when on account of catarrhalic complaints, physicians took occasion to examine Clemenceau, they came to the conclusion that this octogenarian had the constitution of a man of fifty. Considering the frequency of cases like Clemenceau's it does not seem probable that restorative effects, so decided and lasting, are nothing more than just recuperation.

Another case where recuperation was so ef-

fective as to be identical with rejuvenation is the following: A man of sixty-five, completely worn out physically, was brought to a hospital in Vienna. An examination revealed the necessity of subjecting the patient to prostatectomy, but the condition of the patient was such that an operation did not seem advisable. Twelve weeks of careful nursing did not improve the condition of the patient enough to warrant the dangerous operation; so, in order to effect some temporary alleviation, the spermatic ducts were ligated (vasoligation). Quite suddenly, the man regained his strength to such an extent that the performance of prostatectomy was possible.

Cases of this sort are quite numerous, and often the performance of ligation makes it possible to dispense with prostatectomy altogether because, as has been mentioned before, this complaint of the prostate, being concurrent with old age, is very often remedied incidental to the performance of the Steinach Operation; the enlarged prostate simply shrinks without further treatment.

That effects like these, amounting to rejuve-

nation, should not simply be termed recuperation is supported by the results that were achieved when old people, whose only complaints were those usually incident to old age, underwent the Steinach Operation. These old people did not suffer from any disease whatsoever, and submitted to the operation exclusively for the purpose of rejuvenation. As the results of the Steinach Operation were as expected, and as vasoligature was not performed to cure one disease or the other, the only term that should be applied to the results brought about is rejuvenation.

## XX

### NATURAL AGING OR AGING FROM DISEASE

FOR anybody who is not exactly a conscientious objector to rejuvenation, the effects brought about by vasoligature in successful experiments on animals have proved that genuine rejuvenation really exists. If we consider the conformity of the effects achieved in man to those achieved in animals, if we further consider the uniformity that is the basis of all cosmic life, the conclusion seems warranted that what proved to be genuine rejuvenation in animal is also genuine rejuvenation in man.

But right here, a new objection may be raised: that aging in an animal cannot be compared to the process of aging as manifested in a human being; if aging is a natural process in the animal, it is almost an unnatural process in man, because aging in man is mostly brought about by intense work and a mode of



living, the less natural the nearer man dwells to the centers of civilization. Aging brought about in such an unnatural way cannot very well be compared to the process of aging in rats and guinea pigs, which age naturally. As the aging of man is unnatural, the analogy of rejuvenation effects achieved in animals cannot very well be applied to man. This is the objection that must be dealt with.

It is quite remarkable that this objection has been raised in connection with rejuvenation experiments, as most medical knowledge is based on animal experiments. All drugs and every new surgical method is tried on the animal first. It is very truly a medical dogma that what is "sauce for the guinea pig, is sauce for man," even though the surgical treatment or the distribution of drugs must necessarily be adapted to the human system. Why, then, should an exception be taken to this established medical dogma where rejuvenation is concerned?

Another argument to refute the objection that aging in animals cannot be compared to aging in man is the fact that the latter objec-

tion contradicts two protests previously raised; the first being that rejuvenation is unnatural. But if aging in man is unnatural, as explained before, the combat of this process of unnatural aging would amount to nothing else but to establish a natural process of aging.

The second objection, which is contradicted by the objection that aging in animals cannot be compared to aging in man, is the assertion that the Steinach Method results not in rejuvenation, but only in an improvement of certain complaints incidental to old age. If the aging of man is brought about mostly by diseases, the curing of these diseases should result in a retardation of the process of aging unnaturally accelerated by these very diseases. And when these diseases are only combated by the Steinach Method, then the latter would not be a rejuvenation treatment at all, but rather amount to nothing more than an effective combat of diseases, which tend to accelerate the process of aging. At any event these arguments are unpractical and do not amount to anything as far as the entire question of rejuvenation is concerned.

Two more obviously weak points are hidden in the objection that the process of aging in man cannot be compared to aging in animal: First, the fact that aging animals are especially subject to many diseases, and usually to such an extent that it seems doubtful as to whether these animals die of anything but just old age. Rather, it seems that their diseased condition plays an essential part in their demise. Regarding rats, the fact has already been stated that these animals, with the progressing process of aging, fall victims to tuberculosis and mange. A Viennese veterinarian, O. Fiebiger, after inspecting photographs of Steinach's rats, ventured the opinion that the animals may not be old but just emaciated by mange or other parasitic diseases. This objection is unfounded simply because each one of the rats which Steinach used for research work had a pedigree so that its age at the time of the operation could be checked up accurately.

The second weak point is brought out by the fact that the average duration of life is extended with the advancement of civiliza-

tion, contrary to the platitudinous assertion that present day living shortens man's life. H. Friedenthal, who specializes in the study of the average length of life, has established the fact that the heavier their brains (compared with the rest of their body) the longer the life of mammals. As far as man is concerned, Friedenthal's "cephalization factor" theory seems proven since the civilized human being, with his brains more developed, achieves a higher average age than the savage. For this reason it seems utterly unfounded to base objections against rejuvenation on an intrinsic difference in aging between man and beast.

## XXI

### IS THE STEINACH OPERATION DANGEROUS?

IN spite of the general admission that the Steinach Operation, even if not exactly a method of rejuvenation, has certain therapeutic values, the objection is raised again and again that the ligation of the spermatic duct, aside from alleviating the symptoms of certain diseases, is apt to bring on other diseases or else aggravate them. Sometimes, the warning is even sounded that the Steinach Operation is dangerous to life.

This objection was raised first at the Congress of the Deutsche Naturforscher und Aerzte (German Biologists and Physicians) in Nauheim (1920). The opinion was voiced that the ligation of the spermatic duct and the resulting checking of excretion (stasis) may lead to nervous and mental disturbances. A case of insanity as reported by Mendel (1921)

from his own experience, and observed on a patient previously subjected to vasoligature, at a first glance seemed to sustain the raised objection. But, on the other hand, the conclusion seemed permissible that the case of insanity reported by Mendel was not the result of vasoligature, as will be shown presently. As has been stated before, vasoligature was performed long before Steinach to alleviate certain urinary complaints. As a matter of fact, medical records of years ago reporting on vasoligature, state disconcerting experiences similar to that of Mendel, but only in rare instances.

In most of these deplorable cases, it has been possible to prove that certain, easily avoidable mistakes had been made when the ligation of the spermatic duct was performed. In accordance with the old surgical technique, not only the spermatic duct was ligated, but the neighboring tiny blood vessels and nerves as well. This led to grave disturbances in the nutrition of the generative gland, which finally resulted in a quick destruction of the entire organ, and not the generative tissue

alone. In such a case, the same results are brought about as those resulting from too intense exposures of X-rays (X-ray castration). An intense exposure does not stimulate the inner secretion but rather destroys it entirely, thus bringing about a result contrary to the goal aimed at. But since Steinach ascertained the fact that the tiny blood vessels and nerves in the proximity of the spermatic duct should not be ligated, together with the duct itself, detrimental or undesirable effects have not been reported, with the exception of Mendel's case. In this case, however, a mistake had been made. The ligation had been performed simultaneously on both spermatic ducts and in closest proximity to the generative gland. This resulted in a congestion (stasis) as sudden and marked as possible. The effect must have been the same as that produced in cases where a drug has been administered in too large a dose. While vasoligature, before the time of Steinach, often resulted in a checking of inner secretion, the manner in which Mendel performed the ligation on a prematurely aged man of sixty-one



resulted in a swamping of the patient's system with inner secretions, thus tending to poison the system rather than purify it.

There is not one method of therapeutics that does not occasionally result in a harmful secondary effect, such as are usually observed in arsenic and salvarsan treatments. But should a whole therapeutic method be dispensed with, and patients deprived of its benefits, because once in a while a harmful symptom incident to the treatment is observed? It is an established fact that occasional failures of newly developed methods of treatment are criticized much more exactly than any failure of one of the so-called "old, reliable" methods. While nobody thinks of elaborating upon the failure of some old methods, the failure of a new method is held up for public condemnation. There is hardly a single medical treatment of any kind, after whose application a patient has not died at one time or other, be the treatment ever so harmless. In such a case, death following the treatment is often regarded as resulting from it.

In the hundreds of Steinach Operations

which have been observed, and in which the operation proved itself to be not only harmless but a blessing, only three cases had fatal results. The first case was the one reported by Mendel as mentioned before. This patient died at the insane asylum, three and a half months after the operation. The second case where the operation was performed by Lichtenstern, the patient died after one year, having contracted pneumonia, after he had weakened his system considerably by misusing his regained youth. The third case, as reported by Peter Schmidt, was that of a saloon keeper of sixty-two years, who suffered from arteriosclerosis, which was advanced to a point where the walls of the blood vessels had become so brittle that Schmidt could be induced to perform vasoligature only after the patient had actually implored him to do so. In spite of Schmidt's fear that the performance of the Steinach Operation would not result in any appreciable gain, the condition of the saloon keeper improved remarkably. As a matter of fact, his regained vigor would have been lasting if the patient, imbued with a feeling of

his regained strength, had not misused it. As it was, attending to his business, he consumed bottles of liquor nightly, resulting in his death by apoplexy, five months later.

Taking into consideration the fact that these three cases were not immediate results of the Steinach Operation, and can only be considered such by a very liberal stretch of imagination, and considering further, that the patients in hundreds of cases are old people, the percentage of fatal results seems decidedly small. It is beyond doubt that not one of the fatal cases could be attributed to the operation, nor even to the immediate results of the operation. Opposing arguments may be advanced regarding the question whether the rejuvenating effect is actually brought about by vasoligature or not, but there can scarcely be any argument regarding the fact that vasoligature as such, performed according to Steinach's Method, is not an operation which could endanger the life or health of any individual in any way. This is proved by the abundant experiences of Lichtenstern, Schmidt, Benjamin, Chetwood, Knud Sand, Klika, and Rychlik.

## XXII

### IS PREMATURE DECAY BROUGHT ABOUT BY REJUVENATION?

THE few fatal cases, as enumerated before, were eagerly exploited by opponents of the Steinach Method in support of their opinion that vasoligature, employed as a means to bring about rejuvenation, resulted in the forced rallying of the patient's declining strength and, for this reason, by accelerating decay, brought about a premature demise. This contention of the opponents of Steinach is the same as saying that the Steinach Method is not only an unfit method to prolong life, but even liable to shorten the patient's life.

To disprove this contention, there is hardly any other material at our disposal than the experiences which have been collected in connection with animal experiments. The oldest "Steinach cases," *i.e.*, patients who under-

went vasoligature for the distinct purpose of achieving rejuvenation, date back only to November 1, 1918, when Lichtenstern performed the first Steinach Operation. Of course, this span of time is insufficient if compared to the average length of human life, to decide whether this patient is still in danger of "premature decay." So far, there is not the slightest reason to be afraid of such a development, since the first patients are continually enjoying undiminished vigor.

But even if we be permitted to draw upon the material that presents itself from the numerous cases which were subjected to vasoligature, not for the purpose of rejuvenation (like Georges.Clemenceau) but which, just the same, resulted in a distinct manifestation of returned youthfulness, our experiences would date back only as far as two decades.

The remarkable fact presents itself here, that the very same scientists who express themselves in carefully guarded language when they speak on the positive merits of the Steinach Method, become quite careless in their assertions regarding the points which they con-

sider negative. Where did they gather those experiences which would entitle them to speak about "an accelerating decay, bringing about a premature demise"? This claim was first voiced by Stieve, and the very cautious Harms even took occasion to reprimand Stieve. Basing his reproofs on his own experiences, Harms insisted that "Stieve's opinion proves to be decidedly too hasty when by 'rejuvenation' he merely understands an unnatural rallying of youthful urges which is followed by an accelerated decay. Even the restoration of the seventeen-year-old dog, which was almost dying when operated on, lasted for two hundred days." Similar results were observed on rats. Detailed information regarding these experiences are to be discussed in a later chapter on "Rejuvenation and the Prolongation of Life."

The myth of a premature decay can in no way be substantiated by experiences drawn from experiments on animals. Remembering the uniformity of cosmic life, the conclusion seems warranted that "premature decay" as a result of rejuvenation is highly improbable.

Since every principle that ever stood the acid test when tried on human beings below the species *homo sapiens* proved itself correct if applied to man, why should it fail here?



## XXIII

### TOO FEW CASES?

SUPERCAUTIOUS people, who admonish one with a raised index finger and who state that, considering the "still unknown outcome" of rejuvenation, the Steinach Operation cannot very well be recommended unconditionally, as a rule support their opinion by the small number of cases reported so far. Results ever so favorable should not be generalized too hastily, they say. This contention was voiced especially strong immediately after the publication of Steinach's book on rejuvenation (1920), in which Steinach reported on three cases only. At that time the contention was that it was quite unwarranted to draw far-reaching conclusions from such limited material.

To be sure, "Steinach's far-reaching conclusion" was very reserved. The results he had

observed in man, he merely termed "a restitution within modest limits." Peter Schmidt went further in summing up his findings when he stated: "Considering the range and intensity of the results which were produced, one may be permitted to safely say that, by means of vasoligature on man, decidedly more than that (a restitution within modest limits) has been achieved."

The general contention, that too few cases have been reported so far, seems absolutely absurd. Those who complained about the limited number of reported cases had seemingly forgotten that one could not very well start with the thousandth case. Without the publication of the first encouraging results, coöperation and a retesting of the method would not have been as lively as they were. Thanks to the intense interest that was given the subject, steady progress was made, so that we are fortunate enough today to be in possession of quite extensive material for study.

Up to the present time, reports have been made by the following physicians: Lichtenstern, Vienna, reporting on 26 cases (up to

fall, 1920); Peter Schmidt, Berlin, 24 cases (1922); Harry Benjamin, New York, 62 cases (1923), together with numerous other cases reported by Lydston, Stanley, Kelker, Haberer; Rychlik, Finsterer, Kramer, Levy-Lenz, Loewy and Zondek; Payr, Klika, Chetwood, Sand, Voronoff, and others. As all these communications are already superannuated by now, and new reports by the same physicians are to be looked for in the near future, it is difficult to estimate the complete number of successfully performed Steinach Operations. The estimate is so much harder, because for various reasons, many of these cases never became known.

There are certainly many hundreds of rejuvenates today. We surely are not lacking in experience, but this does not mean that it is no longer necessary or desirable to keep on enlarging the extensive experiences reported so far. Even more important than enlarging the material for study is the necessity to continue observing the first cases that were operated upon. The longer this observation is carried on, and the more painstaking it is, the

more valuable will be the material collected. Continuous observations on, and reports by, rejuvenated patients should inform us about the duration and the rotation in which symptoms of rejuvenation appeared and how lasting they may prove to be.

## XXIV

### IS REJUVENATION MERELY DELUSION?

ON these verbal or written reports by rejuvenated patients, the contention is frequently based that these rejuvenates suffer from a delusion, that the Steinach Method in its entirety together with the results achieved by it, is nothing more than mere suggestion. It is claimed that the rejuvenative results of the Steinach Method are essentially nothing more than psychic phenomena, that direct and actual organic results are not accomplished by it, but that these effects to a great extent, perhaps even exclusively, are brought about by suggestion. To make it short: that the patient is simply under a delusion.

Many psychiatrists and psychoanalysts advance this opinion; others do not make as sweeping a statement as that, but hold that the Steinach Operation should be resorted to as a fitting means to teach the patient to overcome,

by his own will, certain symptoms of his condition. These psychiatrists and psychoanalysts would have us believe that an operation, harmless and without any effect (as they claim), will produce even better psychic results than hypnotic or psychoanalytic treatments. They compare vasoligature for rejuvenation purposes with those powders and draughts which a physician prescribes for patients whose ills are only imagined, but which improve his (imagined) suffering by way of suggestion.

As absurd as this argument may sound, it can be supported by the fact that quite a number of rejuvenation symptoms in man are mostly subjective, *i.e.*, can be verified by the physician only to a certain extent and under great difficulties, so that the physician has to rely mostly on the patient's own (subjective) report. Among the symptoms which lend themselves to an unintentional subjective interpretation by the patient belong reports regarding general buoyancy, new joy in life and work, mental and physical ability to work, improved memory, greater acuteness of senses,

growing appetite, relief from shortness of breath and irregularities of heart action, no more itching and trembling, and greater endurance.

It would not be well to dismiss the argument of suggestive results with just a grand gesture, because some of the symptoms enumerated above, belonging within the realm of psychology and only open to subjective observation by the patient, may very well give the impetus to physiological improvements, which can be observed objectively. For example, if a patient—be it by intentional or unintentional appeal to the inherent urge for self-preservation, imagines that he is relieved of shortness of breath and heart complaints, his respiration and pulsation will be quite automatically regulated. In this way his metabolism is improved which, as pointed out repeatedly, is the most important factor for success in rejuvenation. An improved metabolism will result in quite a number of favorable symptoms which may be observed objectively. Growing appetite will result in new fat deposits and in a gain of bodily weight



and girth; a tighter skin will smooth out wrinkles. As a result of a reawakened interest in work, the muscles harden; a new joy in life will make the eyes clearer and brighter. The regulated heart action results not only in a better pulse, but in an improvement of the entire blood circulation, thereby reducing excessive blood pressure.

Frequently the point is raised that even the results of rejuvenation, objectively noticeable as a new growth of skin and glandular tissue, new growth and darkening of hair, and an increase of blood corpuscles could be claimed as results of suggestion. But for all purposes of practical rejuvenation arguments, whether these results are based on an organic or psychological reaction, may be dispensed with, because the main thing is that *these results actually appear*. What is important is that, with the aid of the Steinach Method, rejuvenation can actually be stimulated, be it by way of organic or psychic influence. The moment that this claim is agreed upon—and apparently the two parties agree on this point, then advocates and opponents of the Steinach

Method may shake hands. Then the question as to whether rejuvenation is brought about by suggestion or by way of improved inner secretion merely holds theoretical interest. One point, however, should not be lost sight of: psychoanalytic, or any other mental treatment, is not known to have ever produced rejuvenation results. The probability, therefore, points to organic inner secretoric changes as being the cause of rejuvenation.

The opinion that the latter materialistic conception is correct is substantiated by the fact that the first rejuvenates did not have the slightest idea what happened to them. It is, therefore, hardly probable that these patients were in any way influenced by suggestion. As related before, the first Steinach Operation was performed on patients who were in need of some other surgical treatment in the proximity of the generative gland. To make absolutely sure that these patients would not fall under the spell of suggestion, they were not told that they had undergone vasoligature, in addition to the surgical treatment which was necessary to alleviate their complaints. There

was nothing unethical in concealing this information from the patient, considering the fact that his unbiased reports would be utilized for the benefit of people very much in need of some rejuvenating treatment. Objections, based on ethical reasons, could be raised so much the less since the fact may be considered well established that vasoligature, performed according to Steinach's Method, is absolutely harmless. The very worst that could happen to the patient in consequence of the ligation of the spermatic duct would be that nothing whatever would happen. But as the uninformed patient soon enough reported striking symptoms of restoration analogous to those achieved when the Steinach Operation is performed with the expressed intention to bring about rejuvenation, any doubt as to the materialistic (non-suggestive) cause for the success seemed thoroughly removed.

Among those symptoms of returned vitality enumerated before, as they are usually reported by patients and which on account of their subjective nature do not lend themselves very well to an objective verification, are some

which to a certain extent can be checked up by the physician: These controlling tests are even possible in cases where the patient is not aware of the symptoms themselves, thus excluding the possibility of self-deception resulting from suggestion. For example, regained muscular strength can be tested with the dynamometer. The consumption of oxygen and the improved acuteness of senses can be also tested with exactness without the necessity of informing the patient what these tests are for.

But even patients, well informed that the ligation of the spermatic duct had been performed on them, are liable to furnish contributions to disprove the contention that the Steinach Method produces results by way of suggestion only. It often happens that in the beginning the expected (allegedly suggestive) result is wanting completely. Sometimes results will not show for such a length of time that the physician as well as the patient begin to doubt the probability of any benefiting effect. Naturally, symptoms of utter resignation manifest themselves in the patient when,

suddenly, such objective proofs of rejuvenation as a new growth of hair on spots formerly bald, replacement of white hair with dark hair, offer themselves. From this, we may logically gather that if the results of the Steinach Method were nothing but effects of suggestion, these belated proofs of rejuvenation could never have manifested themselves because the resigned mood of the patient would have forestalled any possibility of a suggestive influence in the direction of positive results.

Anyone who accepts the theory of evolution, that man has developed from an animal state, and who is logically satisfied that there are only distinctions regarding the stages of development, but no real basic differences between the species, would dispense with the arguments as offered above to disprove the contention of suggested rejuvenation. A student of, and believer in, evolution would be satisfied with the evidence offered by rejuvenation experiments on mammals, as it is hardly possible that these animals could have fallen under the spell of suggestion. Since striking results of a restored vitality were offered by

these patients of the animal kingdom, the rejuvenating effect of the Steinach Method should be accepted as substantiated by objective tests. The conclusion seems justified that results achieved on man, analogous to those achieved on so-called "dumb" animals, certainly not susceptible to psychic influence, cannot very well be based on the assumption that they were brought about by suggestion.

## XXV

### IS "REJUVENATION" NO REJUVENATION?

WE do not have to lose any more time with all the other objections which doubt rejuvenation as such, because all these contentions are hardly more than arguments about certain terms, pivoting around the one word or the other but, nevertheless, around *words* solely. Ever and again the reproach is voiced that the term "rejuvenation" is unhappily chosen; for no earthly power could ever bring back the years that have passed and, even if rejuvenated, the rejuvenate still would be as old as he is. The number of years on his back could never be reduced.

But it is common knowledge that the number of years does not mean anything. "One is as old as one feels"; or expressed in the light of modern science, "One is as old as one's glands." Time, as such, is merely a matter



of conception, and especially as far as biological data are concerned, time is no measure with which to distinguish between old and young. The conception of age—the very thing we mean when we speak about being old or young—should be kept apart from the commonplace conception of time, and should be independent of how many summers one has seen.

“Rejuvenation,” others argue, “is an inexact expression, because an old man under no circumstances can again become a youth or a babe in arms.” Those who voice this argument do not stop to remember that Steinach never claimed to be able to achieve anything like a “burlesque rejuvenation” as the Viennese scientist himself dubbed it. Science never strove for, or insisted on, having achieved such a result.

But, by all means, do not let us overlook the fact that we have not yet reached, nor can we surmise, the limits of what may be possible in the realm of rejuvenation, though there have been such marked cases as a septogenarian who, thanks to vasoligature, retro-

developed into a man looking and working as in his early sixties; and an octogenarian to whom was restored the physical abilities of a man of fifty. The appellation "rejuvenation" seems not only very well substantiated, but indispensable when we recall some scientifically established fact produced by vasoligature such as: new growth of dark hair, restitution of youthful elasticity in limbs, tissues, and vessels; renewed joy in work and life and love, restored procreative power; and the disappearance of ailments incident to advanced age—such as cataract, cancer, and arteriosclerosis.

But if the expression "rejuvenation" must be replaced with some other name, then "combating age" or "reënergizing" seem more fitting than others even though they do not bear out scientifically established facts to their full extent. Expressions like "regeneration" and "restoration" could not very well be employed as substitutes for "rejuvenation," because scientifically the term "regeneration" is narrowed down to mean "the reproduction of a part removed or destroyed," while "restora-

tion" is applied to describe "a state of being restored; recovery; as, restoration from sickness."

The term "rejuvenation" with all the hopefulness it implies, covering minutely the true state of affairs, seems the only correct appellation.

## XXVI

### IS REJUVENATION SOMETHING NEW?

IN an earlier chapter, occasion was taken to call attention to the old, seemingly well established, rule that everything new—especially if it be of some vital importance—arouses more or less biased criticism in the beginning. While at first the attempt is made to simply “argue away” the unorthodox new truth as a whole, or to make it out as something utterly valueless, the importance of the new thing is admitted eagerly as soon as it becomes evident that the thing, as such, cannot be argued away any more. The last attack against the newness of a thing usually amounts to a sweeping pronunciamiento that the thing is not new at all—that, in fact, it is as old as the hills.

It is an old commonplace saying that “there is nothing new under the sun.” There has

not been one vital discovery or invention that was not preceded by preliminary discoveries and inventions along the same line. Besides, it is a fact that discoveries and inventions, around the time they become public property, usually "are in the air"; that very often the same thing is almost simultaneously discovered or invented by more than one man. For this reason, frequently it is quite easy to prove that the new discovery or invention is, as a matter of fact, something quite old.

But after the value of the new discovery or invention has been firmly established, the question arises: among the several candidates for the laurel wreath, to whom belongs the greatest honor? Usually, that man is chosen for the honors who either solved the problem that had kept a world puzzled for ages, or discovered the application of an old principle to achieve new results in a realm where this principle has never been exploited before—his, usually, is the victor's palm. For this very same reason, the beginning of a scientifically established theory of evolution is dated around the first half of the last century and

connected with the names of Lamarck and Charles Darwin, and is not credited to the old Greek philosophers who made nature their special study.

The problem of rejuvenation exhibits the three characteristics usually observed when a new truth is given to the world: it is confronted with negation; it has to hold its own against the many attempts to minimize its importance; and it was solved at the same time by at least three scientists, without one of them knowing the others: In America, Lydston; in France, Voronoff; and in Austria, Steinach, almost simultaneously came to the same conclusions. It really seems as if the duplicity of events once again manifests itself in regard to the rejuvenation problem because just now, when Steinach is improving his method for the treatment of women, Voronoff, according to the *Daily Express* of London, is announcing progress along the same line of research.

Even though the ligation of the spermatic duct (vasoligature) had been practiced before Steinach, it seems only fair to connect Stein-

ach's name with vasoligature as far as the latter is practiced for rejuvenation purposes. As a means for experimental research vasoligature was introduced to biology by Bouin and Ancel; Shattock, Seligmann, Regaud, Policard, Kyrle, Tandler, Grosz, and T. H. Morgan performed the ligation of the spermatic duct before Steinach, but for experimental reasons only.



## XXVII

### IS UNINTENTIONAL REJUVENATION POSSIBLE?

THE same objections that are usually raised to strengthen the contention that a discovery is not new at all are also voiced in connection with the Steinach Method. The questions are frequently asked: why is it that, in connection with a ligation of the spermatic duct performed on diseased persons and criminals, symptoms of unintentional rejuvenation are never reported? Why is it that women, who were treated with X-rays for one reason or other, do not develop symptoms of rejuvenescence, in spite of the fact that the X-ray treatment is comparatively old and well established in connection with the treatment of female disorders?

These questions are basically wrong, because they are asked in ignorance of real facts. To be sure, in all those cases where vasoligature for men or X-ray for women were re-

sorted to, unexpected symptoms of rejuvenation were observed. But, as the possibility of rejuvenation was not established then, these symptoms were simply registered as proofs of a surprising, lasting, and sweeping recuperation. Today, however, being better informed regarding the probabilities and possibilities of rejuvenation, we are able to see the real reason for these cases of almost miraculous recuperation. A general inquiry by Holzknecht, among his patients treated with X-ray for certain female disorders, brought out the same fact that was established by Lichtenstern, who investigated the old records of patients who had been subjected to vasoligature and prostatectomy to alleviate urinary complaints. Detailed information of cases where the X-ray treatment, or the surgical treatment, was followed by a miraculous reënergizing of the whole system, with regained youthfulness and renewed joy in life, offered themselves readily and in great numbers. Records, reporting symptoms which we now are able to recognize as symptoms of rejuvenation, had been communicated by Helferich and Isnardi as

early as 1896. Later cases were reported by Chetwood, Payr, Kuemmell, and Haberer, the latter reporting that among his cases were no less than forty per cent in which those symptoms appeared.

Of course, certain questions would seem fitting here: Why should there not have been an even higher percentage of such favorable cases reported; why did not other cases bring positive results; why was it that many physicians reported preponderately unfavorable results after the performance of vasoligature? If these questions are asked, we have to remember that, before Steinach introduced vasoligature for the purpose of rejuvenation, the ligation of the spermatic duct was not performed with the intention of bringing about effects of rejuvenescence. Not trying to achieve such a result and without performing the ligation of the spermatic duct according to Steinach's advice, the operation was not performed in such a manner as to stimulate a regeneration of the generative gland. It is even to be wondered at, that, in spite of the way vasoligature was usually performed, posi-

tive results of rejuvenation resulted at all because, according to the old surgical technique, vessels and nerves in the proximity of the generative gland were none too kindly treated.

If, by performing prostatectomy, the two spermatic ducts are torn apart, as will often happen, one can hardly speak of a painstaking ligation of the *Vas Deferens*, which according to Steinach is the only part to be ligated. If vasoligature is not performed as carefully as recommended by Steinach, the secretion of the generative gland is not checked but rather leaks away. This leakage, of course, makes it impossible to develop the back pressure necessary to stimulate the generative tissue into new growth. And how could a more or less casual tearing of the spermatic gland stop the secretion from leaking out? For this purpose a careful ligation of the spermatic duct (as described in an earlier chapter) is necessary, otherwise through the fragment of the duct still attached to the generative gland, the secretion will leak out into the abdominal cavity without being stored up for regenera-

tion purposes. Occasionally, it may happen that the severing of the duct gives the incentive to a proliferative formation of scar (cicatricial) tissue which eventually will close up the opening of the stump, thus producing the stimulating back pressure. Then, and only then, the accidental severing of the spermatic duct will result in an unintended rejuvenation.

In cases where vasoligature is performed to sterilize criminals, rejuvenation results could not very well be expected, because rejuvenation of young people—and only such usually are subjected to vasoligature for sterilization purposes—cannot very well manifest itself distinctly in men still in the prime of life. But these sterilized criminals seem to have been benefited just the same, because, as Benjamin, New York, reports, quite often shady characters appealed to physicians to perform vasoligature on them. Asked for what purpose, the information was given that accomplices sent to jail have come back all the better for the ligation of the spermatic duct.

Sterility, *i.e.*, the loss of procreative ability, resulting from the ligation of both spermatic ducts, is something entirely different from the loss of potency. The latter is not only preserved, but often strengthened by vasoligature. The ejaculation fluid is discharged as under normal conditions as it is composed of the secretion of several glands, mainly the prostate. When the two spermatic ducts are ligated, however, it does not contain the spermatozoa (the essential element for procreation).

From the foregoing, it becomes evident that, in all such cases where what is called the "Steinach Operation" now was performed before Steinach, accident merely decided whether a case would bring about rejuvenation or not. Quite often this result was frustrated by the lax surgical technique applied. In other cases, no rejuvenative results were to be reported because the physician did not keep the patient under observation long enough. There did not seem any reason for such an extended observation, as the opera-

tion was not performed with the intention of bringing about rejuvenation, but only to alleviate certain complaints.

Even though the ligation of the spermatic duct is not new, Steinach should be awarded the laurel for priority, as far as the application of vasoligature for the expressed purpose of rejuvenation is concerned.



## XXVIII

### IS REJUVENATION IMMORAL?

WHEN, for the sake of fair play and common sense, the fact has been accepted that the discovery of rejuvenation is new, at least in its present state, there are still some other arguments to be drawn upon for the sake of minimizing the reputation of the discoverer.

Arguments, often referred to for exploitation along these lines, are deduced from the fact that it is the sex gland which is drawn upon to give the impetus for rejuvenation, and that it is usually here where symptoms of rejuvenescence manifest themselves first. Alfred Kohn and August Puetter, simply disregarding all the other symptoms of rejuvenation, couched their elaborate criticisms of the Steinach Method in language which made it appear as if rejuvenescence does not amount to anything but a restoration of procreative pow-

ers. Kohn assumes that this fact entitled him to accuse rejuvenation of being immoral. Puetter invented the conception and term of "partial rejuvenation," and strenuously tried to popularize the assumption that Steinach's research work and all its results strove for a restoration of procreative powers as the one and only goal.

The first reproach can easily be disposed of. Experiences so far have taught us that the re-awakened interest for the opposite sex has never yet made itself felt in a way that could be considered disturbing to such a degree as to overshadow the more general results of successful rejuvenation. Harry Benjamin, New York, as well as Robert Lichtenstern, Vienna, and Peter Schmidt, Berlin, report cases where a restoration of procreative powers were not to be observed. Cases like these are then resorted to by opponents of rejuvenation in general as a proof that the results of the treatment were incomplete, amounting to nothing more than "partial rejuvenation." Or, habitually overestimating the importance of the sex element, those opponents of rejuvenation

even misstate the respective cases as absolutely negative in results, though other symptoms of rejuvenation appeared in sufficient intensity.

If reawakened manhood, a by-product of rejuvenation, occasionally is criticized as an immoral disadvantage of rejuvenation as a whole, then the simultaneously reawakened love of, and ability to, work should be considered a sufficient compensation; especially as the reawakened manhood up to now has always remained within the bounds of decency. This is one thing of momentous moral value that should, by no means, be overlooked when haggling over the pros and cons of rejuvenation, namely: that rejuvenation, by restoring mental faculties together with the love and ability to work, endows life anew with high, ethical riches.

But it would have to be considered repulsive indeed if a striking incongruity should manifest itself between reawakened urge and general appearance. However, such an incongruity is impossible if rejuvenation is not only a "partial rejuvenation," as Puetter calls it, but rejuvenation as the term is applied here,

*i.e.*, a general rejuvenation, with the symptoms of reawakened manhood as a by-product only. And as long as there is nothing repulsive in love where young people are concerned, why should it be different with rejuvenated people as long as their appearance, their working ability, and their general acuteness of senses puts the rejuvenates in a class with people much younger than their actual years?

## XXIX

### IS REJUVENATION A SOCIAL DANGER?

BUT even if rejuvenation practiced on large numbers does not imperil morals in general, does not the possibility exist that, in time, rejuvenation may amount to a social danger? Would not the prolongation of human efficiency tend to intensify the struggle for life?

To answer these questions, we have to remember that the discoverer should not withhold his discovery merely because somebody may misuse it. Quite frequently, when a momentous discovery was given to the world, it has been used to the disadvantage of humanity—at least to a certain extent. One has only to remember those startling discoveries, like the airplane which, during the Great War, instead of being used for benignant purposes, were resorted to for malignant ends. It is up to the discoverer to give the world what he has to offer it, and it is then the task of the

world to make the right use of the discovery. That valuable and vital discoveries have occasionally been misused cannot very well be held against the discoverer.

Doubtlessly, there is a wide field to apply and exploit rejuvenation for the common weal of mankind. One does not need to be afraid of oversupplying the world with labor because, even if the world's riches were distributed more equally than they happen to be in our day, it seems rather possible that a shortage of labor will gradually develop together with the return to normal conditions of the world, which was shaken out of its equilibrium during the years of, and shortly after, the war. An oversupply of labor seems the more unlikely, since in almost all civilized countries the birth rate is falling off, and in some of the countries to an appalling degree.

Of course, if by rejuvenation only such elements were to be benefited as are inferior, people imbued with an evil, unethical spirit, who do not stop to consider the rights of the next man, then the application of rejuvenation would not only be unsocial, but immoral as

well. If, however, the leaders and pioneers of mankind, with the aid of rejuvenation, would be enabled to carry on their work in the interest of the general good and welfare of humanity far beyond the point where their usefulness would have ended on account of advanced age, rejuvenation would rightfully have to be acclaimed "a consummation devoutly to be wished."

Considering this possibility, the idea of rejuvenation could hardly suffer from being attacked as immoral and ungodly by those people who, at all times, in all climes, and among all nations, have always claimed that man mastering nature, or at least trying to master it, is committing a deadly sin. Rejuvenation ought to teach us that Prometheus did not die, that the son of Iapetus, endowed with eternal youth, is still bringing us mortals the life-giving fire; and not only the fire of material existence, but also of mental life.



### XXX

#### GENERAL REJUVENATION OR "PARTIAL" REJUVENATION ONLY?

MORE serious than Kohn's reproach that rejuvenation, as such, is immoral is Puetter's objection that rejuvenation even when producing positive results is hardly ever more than "partial" rejuvenation. Puetter insists that the only real criterion for youth is growth; that an organ or organism is to be considered youthful as long as it still develops a surplus of tissue sufficient to result in a growth of this organ or organism. This growth has to be differentiated clearly from any stretching, extension, dilation, or widening of tissue and should be nothing but genuine new growth of tissue. As this new growth of tissue in rejuvenated animals and human beings, up to now, has only been observed as far as the generative gland proper is concerned, Puetter

claims that this observation proves rejuvenation to be nothing but "partial," as the renewed growth is limited to one organ only.

While we may take it for granted that the hardly started microscopic analysis of rejuvenated organs will in time widen our knowledge of the genuine new growth of rejuvenated organs, the fact must be stated that there are some additional parts and tissues of the body where a genuine new growing can be observed. To enumerate them: on the accessory parts of the generative gland—on its accessory glands—on the skin, on skin-like formations, as nails of hands and feet, on the hair, as well as on the muscle and fat (adipose) tissues.

Puetter's interpretation of youth seems somewhat one-sided. For a student of biology, such conceptions as "youth," "age," and "rejuvenation" should be generally applicable to all living beings.

A butterfly that has just emerged from its chrysalis could not very well be termed "old," though it is not going to grow any larger and its life will be only a very short one; it is in complete possession of its ability to fly and

to propagate itself. A fledgling certainly is a young bird in every sense of the word, just able to take its first flight, but as far as growth is concerned, there will be no more, it is fully developed.

Aside from the mistakes pointed out above, the expression "partial rejuvenation" seems to be quite a practical term, especially if we remember that all the symptoms of rejuvenation do not show in all the rejuvenated animals or human beings. In some cases, symptoms of rejuvenation manifest themselves more pronouncedly in an improvement of physical conditions; in others, rejuvenation makes itself felt more strongly in psychological manifestations. Some rejuvenates will show unmistakable signs of rejuvenation in their appearance, in the consistency and renewed growth of their tissues; others will prove themselves rejuvenated by the manner in which they go about their daily tasks. It depends entirely on the individual and his or her original make-up, in what way he or she will react to a rejuvenation treatment.

Puetter narrows his opinion down to a state-

ment which makes it appear as if only the sexual part of life could participate in rejuvenation. At least, he assumes to have thoroughly gone into all the merits of the Steinach Method although rejuvenation of the generative gland (including all its results for sex and propagation) and "partial rejuvenation" seem almost synonymous to him. But, as frequently pointed out before, the very contrary may happen; "partial rejuvenation" may amount to an improvement of the patient's metabolism, to a new growth of skin and hair, to a restoration of his working power. But in spite of all these symptoms of rejuvenation, a return of procreative power may be entirely lacking. In short, any one of the different symptoms of rejuvenation may appear in combination with some other symptom or symptoms. On the other hand, any one of the various symptoms of rejuvenation may be lacking, either in combination with some other symptom or symptoms.

Even as far as one individual is concerned, the combination of rejuvenation symptoms may change. Sometimes the complex of

symptoms, often after a surprisingly long time, is increased by new symptoms, so that what was only a partial rejuvenation shortly after the treatment, in the course of time develops into a total rejuvenation. Of course, on the other hand, it may happen that certain symptoms of rejuvenation wear off; then the rejuvenate enters a second period of senility.

Only in the most propitious cases will all symptoms of rejuvenation show in one individual—functional as well as formal, vegetative as well as generative, physiological as well as psychological symptoms. Anyone who, in a case like this, had occasion to know the thoroughly rejuvenated individual when still decrepit, stands as before a miracle observing the striking changes brought about by the rejuvenation treatment.

Is the value of rejuvenation minimized by the possibility that one cannot exactly count on a total rejuvenation, but ought rather expect the greater probability of achieving only a partial rejuvenation? In connection with this we have to remember first, that there is

always the possibility that a partial rejuvenation, in the course of time, will develop into total rejuvenation. Second, that within certain limits of life and age, partial rejuvenation most probably will benefit such parts of the body as are mostly in need of rejuvenation.

After rejuvenation, as such, brought us face to face with the necessity of formulating and interpreting the conception of "partial rejuvenation," we cannot escape the pressing need to create and explain the conception of "partial aging" (Peter Schmidt). The symptoms of progressing age—"the forebodings of death"—do not appear suddenly and all at the same time, as is well known. Just as all the symptoms of rejuvenation very rarely develop simultaneously, so the symptoms of senility do not appear rapidly and in such a way that one could speak of "total aging." In some individuals an ever growing deficiency of physical strength is first observed; in others the mental faculties are gradually reduced. When in a previous chapter we drew upon the physically, though not mentally, aged scientist as an example of a still youthful men-



talities within a decrepit body, we now have to picture the opposite case; the (according to years) still young man with prematurely gray or thinning out hair and prematurely drained physical strength. There are people whose working ability gives the lie to their still youthful appearance, and there are cases when, in spite of their decrepit appearance, people are still "going strong" as far as their general efficiency and the intensity of their urges is concerned. Exactly as pointed out regarding the different modes in which partial rejuvenation may manifest itself, partial aging may be observed in analogous combinations of the one or the other symptoms.

As a matter of fact, almost all of the would-be rejuvenates are only partially aged. Now, if an individual, suffering from the one or the other deficiency, perhaps even suffering from a combination of deficiencies, undergoes a rejuvenation treatment, it only seems most natural and in accord with all biological reasons that improvements in the patient's condition will most clearly show where deficiencies were manifest before. If the havoc



advancing age had wrought is not beyond repair, these faculties of the mind and body which are the most deficient, will be repaired first, by this creating the impression of partial rejuvenation.

But this apparently partial rejuvenation does not amount to an absolute nor even strictly temporary or localized limitation of the process of rejuvenation. Investigations of Ruzicka have already established the fact that youthful and rejuvenated tissues react alike in their physico-chemical composition. Compared to old tissue, youthful and rejuvenated tissue demonstrate identical marks of differentiation. These decided marks of differentiation not only show in the one or the other tissue, but in all the tissues. This clearly proves that all attempts to minimize the conception and expression of rejuvenation are not in accord with well established facts, and for this reason may be buried in oblivion.

## XXXI

### REJUVENATION AND THE NERVOUS SYSTEM

THERE is only one tissue in regard to which the fact is not yet clearly established as to whether or not it participates in an otherwise general rejuvenation. The question still remains to be solved as to whether rejuvenation is not always to be considered "partial" because the possibility of a regeneration of the nerve tissue is not yet established.

In an earlier chapter, a number of symptoms were referred to which may be taken to indicate that, together with the other tissues, the nerve tissue is restored. But it has not yet been established that this restoration embraces the main components of the nerve tissue, *i.e.*, the ganglion and nerve cells. It seems possible that the fine continuations of the nerve cells, the so-called nerve fibers, regenerate together with the tissue of the organs of sense which,

at least as far as their surfacial strata are concerned, are not made up from nerve substance.

To be sure, the improved memory and power of concentration seems to indicate that there is a causal connection between the restoration of the cerebral cortex (composed of ganglion cells) and rejuvenation. This symptom of rejuvenation may be observed in man either subjectively, through self-observation, or in the course of conversation; for, without the spoken word, no avenue offers itself to investigate whether someone's memory is actually improved or whether only a general improved condition works deception in this direction.

Harms, experimenting on dogs, did not observe any improvement of symptoms of senility in the sphere of the nervous system. There was one dog especially that although quite successfully rejuvenated, remained paralyzed in the hind quarter of his body in spite of an apparent fondness to move around, and as rejuvenation developed, this part of the body appeared to grow even more stiff. Similar observations of negative results, which Harms

at first extended to the acuity of the senses in general, had to be rectified later on, when it became apparent that a formerly diminished capacity for hearing, seeing, and smelling in rejuvenated dogs was appreciably improved.

As already pointed out in the first chapter, nerve tissue as such, apart from the possibility of rejuvenation, commands a special position within the body and usually gives the deciding impetus when death is impending. Respiration and the pulsation of the heart, regulated from the nerve centers of the continuation of the spinal cord—the medulla oblongata—discontinue their work, because the nerve tissue that serves them is not in a position any longer to free itself from the poisonous by-products of metabolism which have accumulated in a lifetime. If these by-products, which show under the microscope as infinitesimal particles of dark color, gain the upper hand, the nerve cells concerned are put out of commission. If this condition has progressed so far, then restoration is impossible. Other species of cells may also be destroyed,



#### NERVE AND GANGLION CELLS

- (1) From the Spinal Cord of a Boy of Three Years, Showing Comparatively Few Pigment Granules.
- (2) From the Tongue-Nerve of an Eighty Year Old Woman, Crowded with Pigment Granules.
- (3) A Single Ganglion Cell, Greatly Magnified, of the same Senile Woman as in 2, Displaying a Tendency on the Part of the Pigment Granules to Condense in Groups.  
(Mühlmann)



but they are replaced by new cells. Not so the nerve cells. They do not multiply after birth. The newly-born child is already endowed with all the nerve cells it will ever need in the course of its lifetime, and just so many it may use up. These nerve cells do not divide, as the nerve tissue completed its full development when the child was still in the mother's womb; they simply expand; they grow as far as the size of the single cell is concerned, but their number remains stationary.

For this reason the nerve cells are always the oldest part of the body. They are just as old as the individual. They age simultaneously with the individual, and the individual ages simultaneously with them. And when these nerve cells have to die, because the poisonous by-products of metabolism gain the upper hand, then the whole body has to die, even though its other organs are not used up and are still in condition to live on.

As the possibility of rejuvenation is based on the ability of the different organs to renew themselves and be restored, and as the prob-



ability of a restoration of the nerve tissue seems scarcely imaginable, man becomes as old as his nerve cells. To make it more plain: man grows as old as those centers of the nervous system where ganglion cells regulate the most important functions of life; such as respiration and the pulsation of the heart. If the efficiency of these centers of life becomes exhausted, then the span of life with which the individual is endowed is also consumed because the nerve cells set the pace for the whole body.

Of course, man can die in numerous other ways. For example: the respiratory surfaces of his lungs, the blood-pumping muscles of his heart can be destroyed by bacteria or fatally injured by mechanical agents, such as a shot or a cut. In such a case, death is not communicated from the nerve center to other vital organs, but rather *vice versa*. Such a demise could not be classified as a natural ending of life, but would have to be termed a premature death; as death was not brought about by general senility, but induced by disease or by an accident.

The question, therefore, is still unsolved whether the purifying glandular secretions, which circulate through the body in greater quantity and better quality after a successful treatment for rejuvenation, also benefit the nerve system to a certain extent, cleansing it from the poisonous by-products that accumulate there in a lifetime, finally resulting in a breakdown. If Harms, who claims that the nerve tissue is not benefited by rejuvenation is right, the combat of age would merely amount to the one thing: reduction of the possibility of some other tissue exhausting itself ahead of the nerve tissue. If this goal could be achieved, all forms of premature (and for this reason unnatural) death would be excluded, with the exception of one; death by exhaustion of the nerve tissue. Successful rejuvenation would make it possible for man to die from normal senility, while at present (according to Notnagel's estimate) only one in ten thousand dies a natural death. All the others die because some of their vital tissues have become exhausted prematurely; because they tired of life, not because they lived their

full life to the end. Rejuvenation once established in the esteem of the world, and generally practiced, would more frequently permit man to drink his cup of life to the very bottom. Man would then be in a position to economically exploit his strength and his gifts to a much higher degree than now. Man would have a greater possibility of reaching the ultimate goal of his journey on earth, limited irrevocably by the deficiency of his nerve centers.

## XXXII

### REJUVENATION AND THE PROLONGATION OF LIFE

DOES it amount to a prolongation of life if the body is capable of thoroughly making use of its most endurable and necessary, but at the same time hardly ever to be regenerated, nervous tissue? Could an avoided shortening of life be considered a prolongation of life? Certainly it could for those 9,999 individuals who, out of 10,000 die prematurely; not for the one, and only chosen one, who may safely laugh at any attempt to combat age. If that really is the case, then rejuvenation amounts to a prolongation of life only in comparison with its probable real length, not in comparison to a possibly more extended duration. Prolongation of life would be relative rather than absolute under such circumstances. But whether this really is the case or not cannot

very well be decided, as it is impossible to say how old an individual would grow to be without recourse to a rejuvenation treatment—maybe this very individual out of his own strength would have grown to be as old as Methuselah. It does not seem worth one's while to try and find a definite answer since the practicability of rejuvenation, as such, does not depend on it. If we were only sure of achieving a relative prolongation of life, *i.e.*, the avoidance of a shortening of life, we would have reason enough to be thoroughly satisfied. At the present time, however, our experiences do not extend far enough back to answer this question as far as man is concerned, so we have to refer to animal experiments. Here two possibilities offer themselves to investigate the question as to probable prolongation of life.

The rejuvenation treatment may be postponed until a time when the animal is in such an advanced stage of senility as to justify the conclusion that the days of the animal were numbered. Of course, this advanced stage of senility, just one jump ahead of death, is not very propitious for the performance of a re-

juvenation operation. Just the same, Harms succeeded in prolonging the life of a dying dog fully two hundred days. A guinea pig in a similar state of excessive senility survived its probable date of demise for four weeks.

The duration of life with and without rejuvenation could also be checked up by comparison between twins or triplets. As the length of life is a hereditary characteristic, the conclusion seems justified that twins or triplets, brought up carefully and under the same conditions, would live approximately the same number of years. Suppose of twin brothers, the one is rejuvenated while the other is not. If the rejuvenated brother as a rule reaches a higher age than the other brother, the conclusion seems warranted that at least a relative prolongation of life, as an incident to rejuvenation, may be taken for granted.

This method based on comparison has been applied by Steinach to rats from the same litter. As a result the fact was established that the rejuvenated brother always lived seven to nine months longer than the brother that had

not undergone a ligation of the spermatic duct. As the average rat hardly ever lives longer than thirty-one months, the postponement of the probable time of demise amounted to about one-fourth of the average length of a rat's life. If we accept this extension of one-fourth of the average life as generally applicable, the postponement of death would be the greater, as the average lifetime of a living being is longer.

As far as man is concerned, a prolongation of life by one-fourth would amount to from seventeen to twenty years, if we base our calculation on the word of the psalmist that "the days of our years are threescore and ten; and if by reason of strength they be fourscore, etc." To be sure, decades will pass until we have gained something like a certainty in this respect. But meanwhile, we may rest assured of some facts which enlarge the extension of our vision and our efficiency to such a degree that we feel entitled, if not exactly to exuberance, at least to a joyful optimism.

Let us assume the most unfavorable aspect, namely, that rejuvenation does not amount to





BLACK RATS: TWIN BROTHERS  
*Lower*, Aged Without Operation  
*Upper*, Rejuvenated by Steinach Operation  
(*Steinach*)



a prolongation of life. In spite of the positive results Steinach achieved when experimenting with animals of the same litter, he expresses himself very guardedly concerning the possibility of a prolongation of life. As a matter of fact, this pioneer of rejuvenation terms the whole question as "just a scramble about words"; probably because it is extremely difficult to distinguish between an absolute and a relative prolongation of life. But even if we assume that this "scramble about words" was decided in the negative, then there would still remain an essential prolongation of human efficiency as a never-to-be-lost gain. Assumed, even, that being rejuvenated or not does not change the date of demise, developments would most probably shape themselves in such a way that, while the remainder of the unrejuvenated life is spent in unproductive and hardly necessary suffering from ever growing impediments of senility, the other could be exploited almost to its very end in vigorous and productive work.

Who would not gladly accept a shortening of life's span if he could only be sure of being

spared days of helpless senility? The myth that rejuvenation may result in "an accelerating decay, bringing about premature demise" (already refuted in an earlier chapter) is apt to gain ground because the decline, once it is unavoidable, develops quite suddenly and rapidly. Instead of attacking the body like a sneaking, chronic disease, senility in a rejuvenate appears like an acute sickness. The decline is more rapid since it had been postponed before, but this only amounts to a shortening of the period of senility and not to a shortening of actual life; as a matter of fact, the contrary seems more probable. This fact has been established in animal experiments; it is hardly plausible that it would be different in man.

Rejuvenation cannot make immortals; that would be expecting too much. Only the various stages of life are differently distributed. The respective duration of youth, prime of life, and old age are merely changed. The time of youth, or at least the time of life's prime, is extended probably to such a degree that a relative extension of the entire span of

life results from it. Senility, with all the hardships which this term implies, is shortened accordingly, and for this reason the process of dying is apparently hastened. Rejuvenated animals, when beyond help for the duration of their last days, were in a stupor and complete apathy. Obviously without pain and scarcely conscious, they gradually passed away. In applying these observations to man, we may feel justified in the comforting expectation, that the gain in physical and mental efficiency vouchsafed to us through rejuvenation, followed by a rapid passing through a stage of acute senility, is crowned by the elimination of the death struggle.

## XXXIII

### REPEATED REJUVENATION

BUT when does the last hour strike, that has been referred to in the last chapter? When is the time ripe, that a living being is beyond help? Doubt often exists regarding the length of time in which the symptoms of successful rejuvenation will last. The belief is frequently professed that ligation of the spermatic duct, or even implantation, will not be efficacious for very long. The Steinach Operation, at least up to now, has not given any reason for the apprehension that its results will only be of limited duration. Experiments on man as well as on animals sustain this conclusion. When Loewy and Zondek observed that the greater consumption of oxygen and the improvement of metabolism soon slackened, the obvious explanation seemed to be that, after a subsiding of the first, over-in-

tense impulses, a normal, balanced condition set in.

But to eliminate the still prevailing, though unjust doubt regarding the limited duration of successful rejuvenation, the most important argument is still to be advanced, namely, that without any trouble whatsoever, the rejuvenation operation can be repeated several times. The operation is not more difficult to perform, and not harder to bear, than the filling of a tooth. And certainly there is nobody who would shrink before the necessity of having a tooth filled as often as the need arises.

The prospects for a repeated rejuvenation operation are not less propitious. He who does not hesitate too long will have only to undergo the ligation of the one spermatic duct. As a rule, the impetus thus given to growth and secretion will prove sufficient at the threshold of old age (recommended by Roux as the most propitious time for rejuvenation) or in cases of premature senility. This ligation on one side (unilateral) may, if symptoms of old age show again, be repeated on the second spermatic duct (bilateral vaso-



ligature). In cases where senility has not progressed too far, it generally seems practical not to create too great a staying of the excretion of the gland, and for this reason the ligation is performed quite some distance from the gland. This precaution seems warranted not only in the light of Mendel's observation (as reported in a previous chapter), but also because a ligation, if not in too close proximity to the gland, opens the possibility of performing the ligation a second, third, or even a fourth time. As each time the ligation is performed nearer to the gland proper, the staying of the excretion of the gland is intensified with each operation.

Whether this procedure may be repeated more often than twice on each spermatic duct, in order to postpone the process of aging, is still to be determined. To be sure, other methods of rejuvenation, based on a revivifying of inner secretion, may be utilized to prolong the effects of the first rejuvenation. Recourse may still be made to Roentgen-ray treatments and transplantations of generative glands. And each of these methods can be

applied repeatedly, even though at the present time they are not yet fully controlled by us.

Steinach, experimenting on animals, achieved three successful rejuvenations through ligating first the one then the other spermatic duct, and finally resorting to the heteroplastic transplantation of a youthful generative gland. Harms, by repeated transplantation of youthful glands, succeeded time and again in suppressing newly developing symptoms of senility.

## XXXIV

### THE FUTURE OF REJUVENATION

ONCE on the right path, our far-flung ideas do not have to stop in the face of these overwhelming possibilities. It took thousands of years to bring the fulfillment of the desire to be young once more within the grasp of serious scientific consideration. Now that the principles of rejuvenation have been made clear to us by solving the miracle of the ductless glands and the riddle of internal secretion, it would scarcely seem magical if the perfections of the first discovery along these lines would become more numerous from day to day—growing immeasurably. The experience frequently has been observed in history that, once a discovery or an invention is made, its perfection moves at such a rapid pace that the time lost before is now quickly regained.

Just let us remember that every irritation

which damages the generative tissue, without destroying the gland proper, results in a proliferation of the interstitial tissue, which in turn stimulates a regeneration of the entire gland. Up to now, we came to know three different irritations: *viz.*, ligation, transplantation, and X-ray exposures. Doubtlessly we will find additional means of irritating the generative tissue. Steinach and the writer have already established the fact that heat is possessed of irritating properties which stimulate the interstitial tissue. This, by the way, explains why colonists and travelers in tropical climes are usually very highstrung; and also accounts for the fiery temperament of people in southern countries, who mature at an early age. Moreover, there are certain drugs that bring about the same result, such as iodine and alcohol.

That method of ligation which is now becoming popularly known under the name of the "Steinach Operation" could produce rejuvenating effects accidentally only under favorable conditions, as long as it was not systematically applied as a means of rejuvena-

tion. The same holds true as far as other methods of stimulating irritation are concerned. It is absurd to voice the argument that if heat and drugs contain rejuvenating properties, one would only have to send old people to warm climes or induce them to imbibe freely of alcohol. It is naturally of the utmost importance that the application of these methods shall be subject to the strictest limitation. The whole body cannot be allowed to fall under the spell of those influences whose incidental symptoms will work havoc, if they are not limited to the sphere where they are needed. To limit thermal and chemical influences to the generative gland, injections and compresses would seem advisable and the slitting of the connective tissue in which the generative gland is imbedded may probably transmit the irritation to the gland proper, thus resulting in a proliferation of the interstitial tissue.

## XXXV

### REJUVENATION INDUCED BY OTHER GLANDS

ONE of the first doubts voiced regarding the possibility of rejuvenation, by way of the generative gland, was based on the contention that it seemed unbelievable to cure, or even to study, senility from one gland only. But let us use this contention to find some other glands which could be utilized to reënergize the body when near a breakdown.

We have already learned that the generative gland is in close contact with all the other ductless glands; for all the glands with an inner secretion belong to the "incretoric association" and are in continuous communication by means of the hormones. On this highly developed system of communication, another even more important system is based—the inseparable relations between the "incretoric association" and the entire body. If the body,

in general, and the ductless glands in particular, constitute an indivisible unit, the body as a whole can be influenced and even rejuvenated by influencing only one of its parts, because all the other parts will have to follow suit; just as any vehicle can be moved by moving one of its integral parts (for instance, by pulling the pole of a wagon), because the different parts of the vehicle constitute one unit.

It does not make the slightest difference whether the wagon is moved by pulling the pole or by pushing it from the back—it unquestionably moves. Only the practicability of the mode of locomotion applied, and the speed with which it is moved, is subject to different opinions. Exactly the same observation may be made as far as the organism of a living being is concerned. It is to be expected that the generative gland will not remain the only part of the body to stimulate the whole unit. Applying the established fact that one ductless gland will influence all the others, the expectation seems logical that the “lever of rejuvenation” in the course of time may be applied to some other gland, and that the



generative gland, together with all the other glands, would be benefited by it.

This assumption which I first took occasion to voice had already been theoretically confirmed by Koppányi; meanwhile, experimental proof has also been furnished. Experimenting with a dog, Buxbaum, by transplantation of the thymus gland, succeeded in achieving symptoms of rejuvenation and effectually combating cancerous tumors. Lately, Romeis, by transplanting the liver, achieved similar results on rats. In this way, he brought about symptoms as they are produced by transplantation of youthful generative glands. The liver, as has been pointed out before, is one of those glands which produces not only an inner, but an external secretion as well. The excretion of the liver is the gall which, by the way of the bile duct, is emptied into the duodenum, the first of the small intestines. Aside from this, the liver produces certain aromatic acids which have a beneficial, purifying influence on the blood. A ductless gland itself, the liver is surely in just as close contact with all the other mem-

bers of the "incretoric association" as is the generative gland, the thymus gland, the thyroid gland, etc. That a rejuvenation of the liver, brought about by transplantation, will eventually benefit the whole body is, observed in the light of our present day knowledge, not altogether miraculous. Romeis communicated his findings to dispel Steinach's assumption of the generative gland as the center of rejuvenation. But Romeis' findings are in no way contrary to the theory of incretoric rejuvenation as expounded by Steinach. Romeis' findings are rather a welcome supplement to the theory advocated by Steinach, and a confirmation of my opinion, that any one of the ductless glands can be resorted to for rejuvenation purposes. Any one of the ductless glands can be put to use as a bourne from whence the elixir of life will flow to the other ductless glands, eventually permeating the entire body.

The idea of trying rejuvenation experiments on the generative gland first grew out of the fact that complaints in its sphere and its deficiency are among the most frequent and dis-

concerting ailments of advancing senility. It even seems at times as if our whole conception of senility was based on the deficiency of these organs, or at least intimately connected with them. Men whose generative glands are not properly developed, or who prematurely (by disease) lose them, give the impression of old (senile) people. As Biedl states, the decrease or the complete loss of generative glandular functions is "accompanied by symptoms of senility which show in the skin and its sweat and sebaceous glands, on hair and teeth, and within the muscle and nerve system."

Quite similarly are the defects if, on account of disease or underdevelopment, the incretion of the thyroid gland is lacking in the blood. Biedl enumerates as symptoms of this deficiency: "Loss of hair and teeth; dry and wrinkled skin, low body temperature; decreased function of the sweat glands; sluggish digestion; reduced metabolism simultaneously with fat deposits and ensuing loss of weight; atrophy of the glandular organs; decrease of mental efficiency and generally reduced abil-

ity of the nervous system." In these symptoms, Biedl sees just as many far-reaching similarities between a deficiency of the thyroid gland and actual senility.

Which conclusion, then, would seem more justified than that these symptoms could be repaired if the lack of thyroidal incretion could be normalized? A revivifying of the thyroid gland would, at the beginning, most probably amount to a partial rejuvenation, with the ensuing symptoms of the rejuvenation manifesting themselves in a somewhat different rotation from that generally observed when the generative gland is revived first. To the same extent to which the revivified thyroid gland would beneficially influence the other members of the ductless gland system, the functions of the other non-glandular organs of the body would return to normalcy. In this manner partial rejuvenation—moving along a different path or, maybe, along the same path but in a different direction—would in the most favorable cases finally enlarge into total rejuvenation.

There is only this one question: in which

way can the aged thyroid gland, or (in other cases) any one of the other ductless glands, be stimulated into a new proliferation and new secretion? To develop applicable methods to this end is just the task left to future intense rejuvenation research work. It will hardly be a ligation as easily performed as on the spermatic duct of the generative gland, because those other glands have no excretoric duct. Maybe other stimuli will be resorted to for the reënergizing of deficient glands—exposures to certain rays; repeated injections; one or frequent implantations of foreign gland substances; maybe even those of animal origin may be put to use. As explained before, it is not necessary that the foreign gland substance shall permanently blend with the body. It would be quite sufficient if the foreign glandular substance should last long enough to stimulate the deficient sister gland into normal functioning. Aiming at this end, it would be easy to develop an extensive research program which, followed with precision, would most assuredly not lack far-reaching results.

Even the most obstinately doubting Thom-

ases, the most irreconcilable opponents, and the most incurable pessimists will not be able to deny that a view full of overwhelming enchantment opens itself before our very eyes—an almost day-dreaming but, at the same time, already wide-awake and consciously happy appraising glance at man's power and man's nature-subduing accomplishments. Man, who has subjected iron and stone to the power of his indomitable will, at last will be the master of his own house. His own life course and career, he will be able to shape according to his wishes. And just as only ruling one's own will enables one to rule others, so sovereignty over one's own body, in the light of this book, will develop man towards a never-dreamt-of new freedom: to unhamperedly shaping mankind's future, to true civilization.

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## XXXVI

### CLINICAL SUPPLEMENT

(The present stand of the Steinach Method)

JUST as scientific treatment of the teeth has grown in the course of years to such proportions as to finally become generally accepted as a hygienic measure, so rejuvenation is gradually permeating all strata of society; its application eventually to become universal and a matter of course.

This is most clearly shown in the diversified reports of practicing physicians in this country as well as in Europe. Even though the application of the Steinach Method is still of comparatively recent date, a large number of cases has already been reported. One need merely delve into this material and pick cases at random to discover extremely interesting facts and statistical data. It is much to be deplored that the numerical material on hand



is so far very limited regarding the type of people that avail themselves of the Steinach Operation. As a matter of fact, the only statistics at hand were compiled and reported in a medical publication by Dr. Harry Benjamin, New York. In these statistics, the professions and trades of 62 patients, who had submitted to vasoligature, were classified. The outstanding feature of this information is the fact that 8 of the 62 patients referred to are physicians, which means nearly 13 per cent. This speaks well for the confidence of the medical profession in this new discovery.

Among the remaining 54 patients, we find, according to Dr. Benjamin's report, 3 dentists, 11 professional men, 27 business men, 11 laborers, 1 municipal official, 1 artisan. It is interesting to note that most of the patients belong to the so-called educated classes, a fact which is also graphically brought out through the patients depicted in the Steinach Film. This film—of which the writer is one of the collaborators, deserves to be mentioned since it gives a clear and scientific visualization of Steinach's life work, and contains pictures of

four Steinach patients before and after the operation. Of these patients, one is a professional man, two are business men, and one is a laborer.

In relating the clinical history of cases, it is difficult to classify the material at hand. It would simplify matters merely to copy the reports of physicians from the various medical publications. However, this would not convey the information in suitable form for the laity. It is to be hoped that time will bring about a more perfect classification, as well as a more definite knowledge, of the medical indications for vasoligature. For the present, we must be satisfied with roughly dividing the reported cases into the following classes, according to results obtained (dispensing with purely medical indications like organic diseases) :

1. Prolongation of human efficiency by improving physical strength.
2. Prolongation of human efficiency by restoration of mental activity.
3. Cases where the acuity of senses were regained or improved.

4. Cases where arteriosclerotic conditions and high blood pressure were alleviated.
5. Cases where premature old age or actual senility were deferred.
6. Cases where mental depression was alleviated.

To illustrate these six points, the following cases have been selected and compiled from the various printed reports:

1. Case of a packer, 54 years old, who had lost 44 pounds, from 1914 to 1916. The diagnosis was arteriosclerosis and chronic heart disease. The patient could not work, on account of continuous pains in his back. He fell asleep frequently during the day, but could not sleep at night. His memory was very weak and, for over a year, he suffered from impotency. One and a half months after the operation, he was working again, slept well, and reported to his physician, "I feel fine and everyone says I look great. My eyesight is clearer and I can read newspapers without glasses. I feel well and strong as never before." Two months after the operation, his



FIFTY-FOUR YEAR OLD PACKER

(a) On the Day of the Operation.

(b) Two Months and Two Days After the Steinach Operation Had Been Performed on One Side by Dr. Peter Schmidt, Berlin. Note the Improved Appearance of the Patient, the Gain of Girth and Weight.

(Schmidt)



occasionally recurring heart attacks had ceased altogether. The patient looked so changed that a control photo was taken. He had gained nine pounds in three months and was imbued with a new feeling to live and love.

(As reported by Dr. Peter Schmidt, Berlin, in his book, "Theorie und Praxis der Steinachschen Operation".)

2. Case of a truck driver, 43 years old, who was sent to the hospital on account of his evident loss of weight and extremely poor general condition. He went back to his work as a driver and worked harder in spite of poorer food. A year after the operation, he had gained 32 pounds in weight, could carry a load of 200 pounds, had well-developed muscles, and his hair and beard had grown thicker.

(Case of Dr. Robert Lichtenstern, Vienna, as reported by Norman Haire, M.D., in "Medical Life," June, 1922.)

3. Case of an editor, 58 years old, whose principal complaints were waning mental abilities and frequent severe headaches. Three and a half months after the operation, his mental faculties—such as power of concen-

tration—were as perfect as they ever had been in the past. In another two months, all physical and mental complaints had completely disappeared, especially his headaches, and the patient enjoyed perfect health.

(As reported by Dr. Harry Benjamin, New York in "American Medicine," August, 1922, and "Endocrinology," November, 1922.)

4. Case of a college professor, 55 years old, whose principal complaints were unusual tiredness, lack of ambition, failing memory, and general mental depression. For three or four years, he suffered from increasing deafness, due to arteriosclerosis of the internal ear. Six weeks after the operation, the patient reported by letter, "The hearing has slightly but unmistakably improved. For the first time, standing close to a chest of drawers on which are two alarm clocks, I can hear the ticking. Before the operation, this was never possible. A family I visited yesterday remarked that they noticed I could hear better. I also experience a buoyancy and a general feeling of well being that I have not had for a long time, and many remark that I am looking



exceedingly well." Seven months after the operation there was a marked improvement in every way. The patient's hearing was much better, as was proved by the objective methods of the same ear specialist who had made the diagnosis before. There was an increase of weight amounting to six pounds and his blood pressure was lower than before.

(As reported by Dr. Harry Benjamin, New York, in "American Medicine," August, 1922, and "Endocrinology," November, 1922.)

The foregoing case lends itself admirably in showing both regained mental efficiency and the return of acuteness of the senses. Another case illustrating the improved and regained acuity of senses is the following:

5. Case of a watchmaker, 36 years old, who suffered from premature senility and who, five and a half months after the operation, had returned to his work which he had discontinued for many months, feeling as ambitious and self-assured as ever. The patient volunteered two interesting statements: first, that he had been using a two-and-a-half inch focus magnifying glass for his work, which he now

found too strong, and was compelled to change to a three-and-a-half inch focus. Second, he has to shave daily while formerly every two to three days was sufficient.

(As reported by Dr. Harry Benjamin, New York, in "Endocrinology," November, 1922.)

6. Case of a man, 40 years old, who sought consultation for loss of memory, weight, and power of concentration; for lassitude, mental dejection, severe backaches, and general weakness and impotence. He was subjected to electrical treatments, but these, together with mental stimulation and the administration of testicular extract, proved useless. Finally, he underwent the Steinach Operation. As a result, in six weeks' time, the patient's improvement was marked and, later, all the symptoms were relieved.

(As reported by Dr. Leo Michel in the "Urol. & Cutan. Review," 26:137, March, 1922.)

7. Case of a physician, 51 years old, who was completely broken down mentally. He had no perseverance in his work, suffered from great depression, and had the greatest trouble

in making up his mind when he was obliged to do so. Three months after the operation, his physical condition was satisfactory in every respect; he had more energy and perseverance. Nine months after the operation, the patient wrote, "The improvement has continued; appetite and sleep are good; am putting on flesh and am attending to my practice without exertion. The principal improvement is that the mental depression has disappeared. I look more optimistically on life and feel more resistance, more inclined to work, and have more initiative."

(As reported by Dr. Knud Sand, in "*Acta Chirurgica Scandinavica*," Vol. LV, IV.)

8. A clerk, 58 years old, was under the physician's care, suffering from mental depression, lack of energy, and inability to attend to his clerical duties. He was in a condition of complete exhaustion and feared that he would be unable to retain his position. He was troubled with a varicocele on the left side, which was operated upon. Without the patient's knowledge, the Steinach Operation was performed at the same time. Five

months after the operation, this man was greatly changed for the better. He had lost his weary, anxious expression, had regained his appetite and weight, and once more felt ambitious and was able to attend to his work properly.

(As reported by Dr. Harry Benjamin, New York City, reprinted from "American Medicine," August, 1922.)

9. Case of a retired merchant, 80 years old, who was listless and tottering, swooned frequently, had lost his memory, and was quite helpless. Without promising the patient anything or telling him what was to be done, the operation was performed, in which procedure the patient took no interest whatsoever. Two months later, the patient presided at a very jolly party in honor of his eightieth birthday, made a witty speech, noticed and complimented the ladies present. He resumed his walks and is once more interested in life.

(As reported by Dr. Victor G. Vecki, San Francisco, in "Journal of Sexology and Psychoanalysis," March, 1923.)

10. Another case of premature senility is

that of a contractor of 58 years, who was operated upon in February, 1922. In August of the same year, a marked improvement in the patient's condition was observed. His mental depression and listlessness left him. He gained in weight and his general appearance was much better. The patient reported a freer perspiration than in former years; also a stronger growth of beard, as evidenced by the necessity of more frequent shaving. His blood pressure became normal and his prostate troubles were relieved. Most important of all, the patient felt perfectly able to resume business responsibilities, which he had been forced to discontinue for a number of years.

(As reported by Dr. Harry Benjamin, New York, reprinted from "Endocrinology," Nov., 1922.)

11. An interesting case is that of a patient who was so old at the time of the operation, that the surgeon had serious doubts as to the probability of his present existence, especially since he had received no communication from him from the time of the operation to the date of his inquiry. He therefore sought informa-

tion from the man's medical adviser, asking how long the patient had been dead. Imagine his astonishment when told that, instead of being dead, the man had gone down South recently to celebrate his ninety-second birthday!

(As reported by Dr. Charles H. Chetwood, New York City, from the "New York State Journal of Medicine," June, 1922.)

12. Considerable evidence regarding the application of the Steinach Operation was collected by Dr. Abraham Wolbarst, who treated a number of cases, mostly in a home for aged men. Of eleven patients studied, seven were actually senile, and four were prematurely senile. Of the seven cases of actual senility, five of the men were typical of the decrepit and hopeless inmates of homes for old men. The operation was undertaken in the hope that it might result in a stimulation of such gonadal endocrines as still remained in their emaciated bodies. They were not informed at any time what effects were sought to be produced, but were persuaded to submit to this painless operation in the belief that it might strengthen



them and relieve them of their predominant pains and infirmities. In concluding his report, Dr. Wolbarst says, "If any conclusion is to be reached as the result of a study of these cases, one would be justified in saying that the operation has been distinctly advantageous to the patients who have been subjected to it. It is not necessarily a sexual operation; it must be considered a powerful endocrine stimulant and activator. In the actually senile patients, the most striking result has been the marked decrease in blood pressure, and a feeling of well being that is appreciably noticeable. . . . In view of the fact that it is painless, that it involves no risk, and that there is but little loss of time, there seems to be no reason why this operation should not be advised in every case of active or premature senility suggestive of endocrine insufficiency."

(As reported by Dr. Abraham L. Wolbarst, New York City, from the "New York Medical Journal & Medical Record," for May, 1922.)

13. Regarding the application of the Steinach Method on women, no detailed re-



port of cases is available except the records of six cases treated by Dr. Harry Benjamin, New York, by means of X-ray exposures. Of those six cases, one was an educator, 64 years old, who suffered from "mental sterility" and who reported that six weeks after the treatment (consisting of four exposures given at intervals of one week) she felt her brain clearer, did considerable more work, and that she felt more "sustained" in it. New ideas had come to her "like a flash" as never before. Five months after the treatment she said that nothing could tire her any more. Her healthy appearance was remarked upon by friends and her blood pressure had somewhat decreased. A year after the treatment, her condition was unchanged and satisfactory in every way.

14. Another case was that of a professional dancer, 48 years old, who complained of becoming easily exhausted, lacked the necessary energy, and was very anxious to regain her "full strength" for her work. During the months of March and April, 1923, five X-ray treatments were administered. Two months

later, she noticed a distinct increase of firmness of her flesh and was less nervously fatigued. Her husband claimed she looked as she did twenty years ago and was so impressed by the change in her appearance that he himself, a man of 61, decided to have the Steinach Operation performed.

## REFERENCES

ANCEL, P.; *see* BOUIN.

BENJAMIN, HARRY, "Preliminary Communication regarding Steinach's Method of Rejuvenation." *New York Medical Journal*, December, 1921. Abstract of the foregoing and discussion, *Int. Journal of Surgery*, February, 1922.

"The Effects of Vasectomy (Steinach Operation)." *American Medicine*, N. S. Vol. XVII, No. 8, pp. 435-443, 1922.

"Theory and Practice of the Steinach Operation." *New York Medical Journal and Medical Record*, August 16, 1922.

"The Steinach Operation. Report of twenty-two cases with Endocrine Interpretation." *Endocrinology*, Vol. VI, No. 6, pp. 776-786, 1922.

BIEDL, A. "Innere Sekretion," Urban & Schwarzenberg, Wien-Leipzig, 2. Bd. 2. Aufl. S. 272, 1913.

BOUIN, P. and ANCEL, P. "Hypertrophie ou atrophie partielle de la glande interstitielle dans certains condition experimentales." *Comptes rendues de la Soc. de Biol.*, Paris, 57, I, p. 554, 1905.

"La glande interstitielle du testicule et la defense de l'organism, hypertrophie ou atrophie partielle de la glande interstitielle au cours de certaines maladies chez l'homme." *Comptes rendues de la Soc. de Biol.*, Paris, 57, I, p. 553, 1905.

- BROWN-SEQUARD, CHAS., *see* "Comptes rendues de la Soc. Biol., de France"; and "Archives de Physiologie normale et pathologique," 1889.
- CHETWOOD, C. H. "Vasoligature and Steinach's investigations." *New York State Journal of Medicine*, June 1922.
- CORUCRS, GEORGE F. "Rejuvenation. How Steinach Makes People Young." Thomas Seltzer, New York.
- FIEBIGER, O. J. "Ueber die Rattenräude und ihre Beziehungen zu den Steinach'schen Verjüngungsversuchen"; *Wiener Klinische Wochenschrift*, 1921, Heft 34.
- FINSTERER, HANS. Verhandlungen der Deutschen Gesellschaft für Urologie, V. Kongress in Wien, 1921, S. 224.
- FRIEDENTHAL, H. "Allgemeine und spezielle Physiologie des Menschenwachstums," Berlin, 1914.
- HABERER, "Vasektomie bei Prostatahypertrophie," *Med. Klinik*, 1921, Nr. 14.
- HARMS, W. "Experimentelle Untersuchungen über die innere Sekretion der Keimdrüsen." Jena, Verlag G. Fischer, 1914.
- "Keimdrüsen und Alterszustand." Berlin-Wien, Verlag Urban und Schwarzenberg, 1922.
- HARROW, BENJAMIN, "Glands in Health and Disease," E. P. Dutton and Co., New York, 1922.
- HELPERICH, "Ueber die Resektion der Samenleiter als Heilmittel bei Prostatahypertrophie." *Deutsche Medizinische Wochenschrift*, Nr. 2, 1896.
- HOLZKNECHT, GUIDO, *see* Steinach and Holzkecht.
- ISNARDI, "Die Behandlung der senilen Dysurie mit Durchschneidung und doppelseitiger Unterbindung

der Vas deferentia." *Therapeutische Wochenschrift*, Nr. 2, 1896.

KELKER, *see* STANLEY.

KAMMERER, PAUL, "Ueber Verjüngerung und Verlängerung des persönlichen Lebens."

Stuttgart und Berlin, Deutsche Verlags-Anstalt, 1921.

"Geschlechtsbestimmung und Geschlechtsverwandlung." Wien und Leipzig, Verlag Moritz Perles, 2. Auflage, 1921.

"Tod und Unsterblichkeit," Stuttgart, Verlag E. H. Moritz, 1923.

KOHN, A. "Jugend und Alter," *Wiener Klinische Wochenschrift*, 1921, Heft 34.

KRAMER, "Bericht über eine nach Steinach operierte Melancholie"; *Deutsche Med. Wochenschrift*, 1921; 47.

KUNTZ, A. "The innervation of the gonads in the dog." *Anat. Rec.*, Phila., 1919, I; XVII, 203-219.

"Degenerative changes in the seminal Epithelium," *Endocrinology*, March, 190-204.

KYRLE, J. "Ueber die Hypoplasie der Hoden im Jugendalter und ihre Bedeutung für das weitere Schicksal der Keimdrüsen"; *Wiener Klinische Wochenschrift*, 1920, XXXIII, 185-188.

"Ist Steinach's Lehre zwingend?" *Med. Klinik*, 1921; Nrs. 34, 35.

LESPINASSE, V. D. "Transplantation of the testicle." *J. Am. M. Assn.*, 1913, LXI, 1869.

LEVY-LENZ AND PETER SCHMIDT. "Erfahrungen mit der Steinachschen Operation"; *Deutsche Medizinische Wochenschrift*, 1921, Nr. 12.

LICHTENSTERN, R. "Bisherige Erfolge der Hodentrans-

plantation beim Menschen."

*Jahreskurse für ärztliche Fortbildung* XI, April, S. 7-11, 1920.

"Die Erfolge der Altersbekämpfung beim Manne nach Steinach."

*Berliner Klinische Wochenschrift*, LVII, Nr. 42, S. 989-995, 18, Oktober 1920.

LIPSCHUETZ, A. "Die Pubertätsdrüse und ihre Wirkungen"; 1920, Bircher-Verlag, Bern u. Leipzig.

"On the internal secretion of the sexual glands"; *Journal Physiol, London*, 1917, LI, 283-286.

"Quantitative Untersuchungen über die innersekretorische Funktion der Testikel." *Deutsche Med. Wochenschrift*, 1921, Nr. 13.

"Die Lehre Steinachs"; *Deutsche Med. Wochenschrift*, 1921, 47.

LOEWY, A. AND ZONDECK, H. "Der Einfluss der Samenstrangunterbindung auf den Stoffwechsel." *Deutsche Medizin, Wochenschrift*, 47. Jahrgang, No. 13, 1921.

LORAND, ARNOLD, "Old Age Deferred"; F. A. Davis Co., Philadelphia, 1920.

"Life Shortening Habits and Rejuvenation," F. A. Davis Co., Phila., 1922.

LYDSTON, G. F. "Impotence and Sterility with aberrations of the Sexual Function and the Sex-Gland Implantation." Chicago, The Riverton Press, 1917.

"Transplantation of a testicle from the dead to the living"; *New York Med. Journal*, 1914, C, 67-68.

"Sex gland implantations," *J. Am. M. Assn.*, Chicago, 1916; LXVI, 1540.

- "Further evidence on sex gland implantation."  
*J. Am. M. Assn.*, 1919, LXXII, 396-398.
- MAUTNER, H. "Beziehungen der Pubertätsdrüse zum Verlauf der Tuberkulose," *Wiener Klin. Wchnsch.* 1921, 34, 300.
- MENDEL, KURT, "Zur Beurteilung der Steinachschen Verjüngungs-Operation"; *Deutsche Med. Wochenschrift*, August 25, 1921.
- MITCHEL, LEO, "Result of the Steinach operation." *Urol. & Cut. Rev.*; 26:237, March, 1922.
- MOORE, CARL R. "The production of artificial hermaphrodites in mammals"; *Science*, Lancaster, Pa., 1920, LII, 179-182.
- MORGAN, T. H. "Effects of ligating the testes on hen-feathered cocks"; *Biol. Bull.*, 39:248, 1920.
- MORRIS, R. T. "A case of heteroplastic ovarian grafting followed by pregnancy and the delivery of a living child." *Med. Rec.*, N. Y., 1906, LXIX, 697-698.
- MUEHSAM, R. "Weitere Mitteilungen über Hodenverpflanzung." *Deutsche Med. Wochensch.*, 1921. No. 30.
- PAYR, E. "Ueber die Steinachsche Verjüngungsoperation." *Zentralblatt für Chirurgie*, Nr. 37, 1920.
- PEZARD, A. "Le conditionnement physiologique des caracteres sexuels secondaires chez le Gallinacs." *Bull. biol. Fr. & Belge*, 1913, LII, 1-176.  
"Secondary sexual characteristics and endocrinology." *Endocrinology*, Los Angeles, 1920, IV, 527-540.
- POLL, HEINRICH, "Die biologischen Grundlagen der Verjüngungsversuche von Steinach," *Medizinische Klinik*, Berlin, Nr. 36, 1920.
- PUETTER, A. "Der Nachweis der Verjüngung." *Die*



- Naturwissenschaften* VIII, Heft 49, S. 948-954, 1920.
- ROMEIS, B. "Geschlechtszellen oder Zwischenzellen?" *Klinische Wochenschrift* 1, Nr. 19-21, 1922.
- ROUX, W. "Der Kampf der Teile im Organismus." W. Engelmann, Leipzig, 1895.
- "Steinach's Verjüngungsoperation." *Deutsche Med. Wchnschr.*, 1920, 46.
- RUZICKA, V. "Hysteresis des Protoplasmas und das Problem der Verjüngung." *Deutsche Med. Wchnschr.*, 48; 931, 14, Juli, 1922.
- SAND, KNUD. "Vasectomy beim Hunde als Regenerations-Experiment," *Zeitschrift für Arzt. Fortbildung*, No. 1, 1922.
- "Moderne experimentelle Sexualforschung, besonders die letzten Versuche Steinach's (Verjüngung)." *Zeitschrift für Sexualwissenschaft*, Bd. VII, Heft 6.
- "Experimenteller Hermaphroditismus." *Arch. f. d. ges. Physiol.*, Bonn, 1918, CLXXIII, 1-7.
- "Vasoligature (Epididymectomy) employed ad mod. Steinach with a view to Restitution in Cases of Senium and Other States (Impotency, Depression)." *Acta Chirurgica Scandinavia*. Vol. LV. Fasc. IV.
- SCHMIDT, PETER, "Theorie und Praxis der Steinachschen Operation." Wien-Leipzig-München, Rikola-Verlag, 1922.
- STANLEY, L. L. "Testicular substance implantation." *Endocrinology*, November, 1921.
- STANLEY, L. L. & KELKER, J. "Testicle transplantation." *J. Am. M. Assn.*, 1920, 75, 1501-1503.
- STEINACH, EUGEN. "Verjüngung durch experimentelle Neubelebung der alternden Pubertätsdrüse." Berlin, Verlag J. Springer, 1920.

"Altersbekämpfung und Räude." *Wiener Medizinische Wochenschrift*, 1921, Nr. 31.

"Keimdrüsen und Organisms." Wien-Leipzig, Rikola-Verlag. (in preparation).

"Pubertätsdrüsen und Zwitterbildung." *Archiv für Entwicklungsmechanik*, XLII, Heft 3, s. 1-2, Taf. 1, und 11, 1916.

"Willkürliche Umwandlung von Säugetier-Männchen in Tiere mit ausgeprägt weiblichen Geschlechtscharakteren und weiblicher Psyche." *Pflügers Archiv für die gesamte Physiologie*, 144 Bd., S. 91, Fussnote 1, 1912.

and G. Holzkmelch. "Erhöhte Wirkungen der inneren Sekretion bei Hypertrophie der Pubertätsdrüsen." *Archiv für Entwicklungsmechanik* XLII, S. 490-507, 1916.

and P. Kammerer. "Klima und Mannbarkeit." *Archiv für Entwicklungsmechanik* XLVI, Heft 2 und 3, S. 391-458, Taf. XX, 1920.

STIEVE, H. "Verjüngung durch experimentelle Neubelebung der alternen Pubertätsdrüse." Ein Referat. *Die Naturwissenschaften*, VIII, Heft 33, S. 643-645 (auch Heft 46, S. 895-903), 1920.

TANDLER, J. & GROSZ, S. "Die biologischen Grundlagen der sekundären Geschlechtscharaktere," Berlin, J. Springer, 1913.

TRIDON, ANDRE. "Psychoanalysis and Gland Personalities." New York, Brentano.

VECKI, VICTOR G. "Organotherapy in Sexual Impotence." *J. of Sexology and Psychoanalysis*, March, 1923.

VORONOFF, SERGE, "Vivre. Etude des moyens de reveler l'énergie vitale et de prolonger la vie." Paris, Bernard Grasset, 1920.

"Greffes testiculaires." Paris, Octave Doin, 1923.

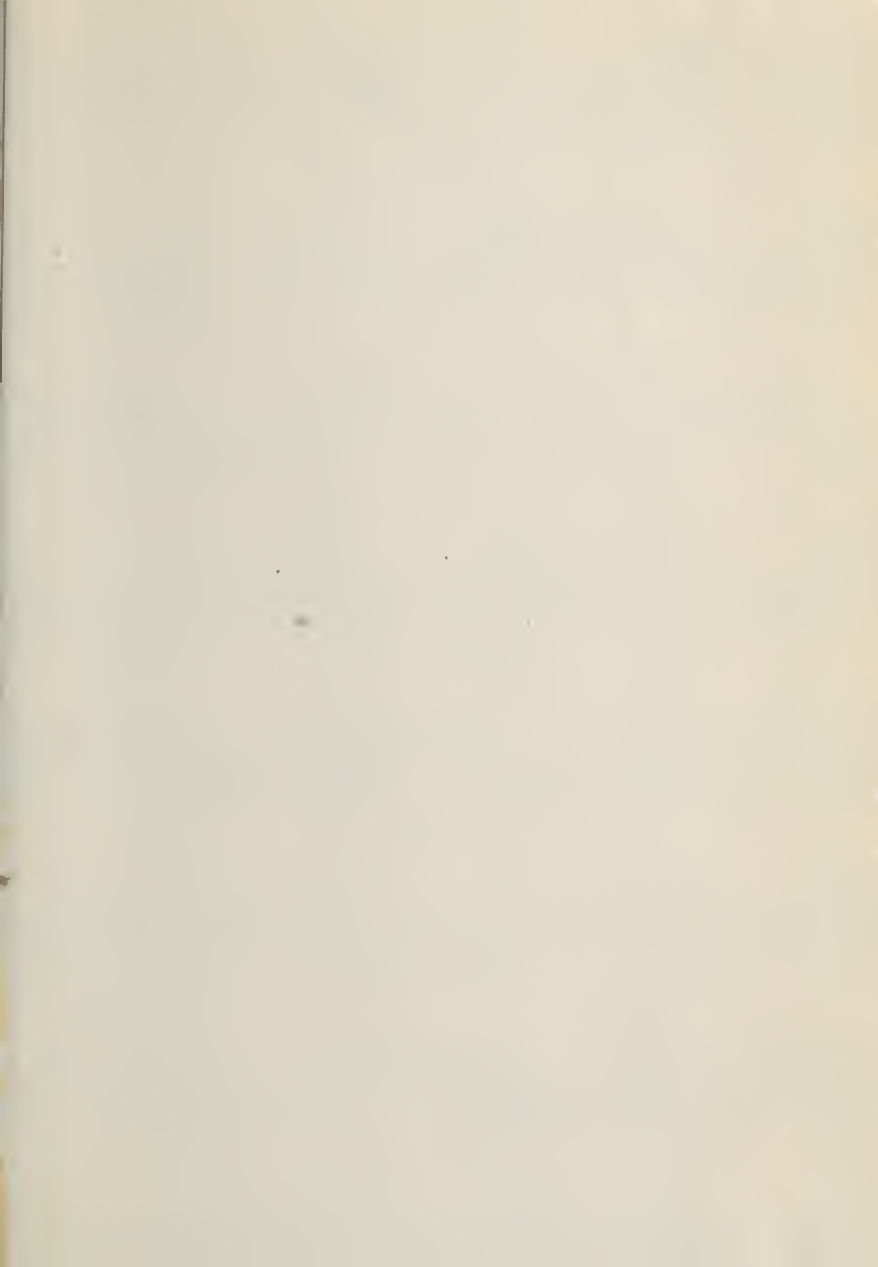
- WILHELM, OTTMAR. "Rejuvenecimiento." *Revista Medica de Chile*. May, June, 1922.
- WOLBARST, ABRAHAM, "A report on the Steinach operation in Senility and premature senility." *N. Y. Med. J. and Med. Rec.*, May 3, 1922.
- ZONDECK, H.; *see* LOEWY, A.



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